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Keeping Track of Sales and Distributors

Cards and Forms for Recording Sales and Shipping Data in Shop and Office—Records to Show Activities of Agents

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IN THESE days when sales are harder to make than they have been for years, an efficient system of sales records is a big help. This is particularly true of a company like ours where most of the sales are made through dealers. By this I don't mean that such records

SALES ORDER No.	CUSTOMER'S ORDER No.	Machine No.	Charged
Date	Date	Lot No.	Shipped
Sold to			
Address			
Shipp. Direct			
Price		Terms	
Sales for Month		Date Promise	
Total		to Ship on	
Sales to 1st Month		Shipped Via	
Total to Date		Remarks	

FIG. 1. SALES ORDER RECORD CARD

are not equally valuable to the manufacturer who sells direct, but rather that the builder who distributes his product through dealers must have adequate means of knowing exactly what each dealer is producing in the way of sales in the various territories which he may happen to represent.

Our system of sales and distribution records is not perfect, and probably would not be applicable exactly as it stands to any other company; but there are ideas and methods connected with it that may prove of some benefit to others. Some of the incongruous elements that will appear later are due to the fact that certain forms and methods have been retained from each of the two companies which were united in 1909 to form the Cincinnati-Bickford Tool Co. The differences in the two systems, in such cases, were too small to warrant the time and expense necessary to change them, and they have consequently been allowed to run along ever since the beginnings of the present company.

Upon receipt of an order, the 4 x 6-in. card form, shown in Fig. 1, is filled out. If the order is for a radial drilling machine a white card is used. Upright drilling machine orders are entered on blue cards and orders for repair parts on salmon-colored cards. Our sales order number is put in the upper left-hand box prefixed by "R" for radial or "U" for upright as the circumstances demand. The dealer's order number goes in the next box. Dates of each are, of course, put in the indicated places.

In the third box are the machine and lot numbers. We use letters to indicate the various sizes of uprights and numbers and letters for the radials, 4A indicating a 4-ft. universal machine, and 4D, a 4-ft. plain, for instance. The requisite dates are inserted in the right-hand box at the proper times.

Just below the boxes a description of the machine is entered. After "Sold to" comes the name of the dealer who placed the order and then his address. Shipping directions show the final purchaser's name and address to which the machine is to be shipped. His order number is also put down if it is known.

Opposite "Price," we put the list price, the discount and the net price to the dealer. Under the net price to the dealer goes the amount of sales in the current month. Addition gives the total sales for the month including the present sale. Below this total again is the amount of the sales for the current year up to the first of the

Date..... Order No.....

THE CINCINNATI BICKFORD TOOL CO.
Cincinnati, Ohio

MARKS

FOR.....
ORDER No.....
WEIGHTS: Gross..... Net.....

FIG. 2. SHOP TICKET

current month, and below that the total including the present sale.

The entry opposite "Terms" depends on the contract with the dealer or customer. In the main the terms are uniform, but it might be necessary to have some differ-

ence, as for example between domestic and foreign connections.

The following six rectangles for dates are to indicate the time when shipment is promised or to note the date when shipment is requested by the customer. The other two items are self-explanatory.

On the back of the card, which is unruled, we place in the upper left-hand corner the amount in dollars of the total unfilled orders on our books. From that figure we deduct any shipments or cancellations that may occur before the face of the card is filled out. When an order is received and the face of the card is filled out, the amount of the order is added to the net total on the back and we then have the new amount of unfilled orders. This amount we transfer to the back of the next unfilled card which becomes the live-card in the front of the file waiting for the next order.

As soon as shipment is made the card we have filled out completely is shifted to the back of the file, where it remains until the end of the month. Then the records are transcribed to the proper places and the card goes to the permanent file under its order number.

From the form of Fig. 1 the shop ticket shown in Fig. 2 is made out. This form is yellow for regular upright drilling machines, and is made out in triplicate, one copy going to the shop foreman, one to the cost department and the third to the shipping department. The order number is the same as the sales order number. In the upper space is a description of the machine. The lower space has the name and address of the customer and the serial number of the machine.

After "For" appears the dealer's name and below it his order number. Weights are put on in the shop.

A similar form on blue paper is made out in quadruplicate for special upright drilling machines and for accessories and attachments. The fourth copy goes to the routing department so that the special features can be controlled.

For radials and repair parts a salmon-colored form is used. This, too, is made out in quadruplicate.

The lot record of Fig. 3 is a 9½ x 12-in. form used both for temporary and permanent record. When it is decided to put a new lot of machines through the shop a pencil record is made out on this form. The lot number is put at the head of "Lot No." column and below it are entered as they come in, the sales orders under which the various machines are shipped. The machine numbers are all put down in column five and assigned to the various order numbers as the circumstances direct.

Column two is filled out by judgment based on the trend of sales as shown in the record. For instance, in a given lot of uprights, six might be built with tapping attachments, the balance without. In the next column any special requirements of the customer are entered from the sales order.

In columns six and seven are put the name and address of the dealer placing the order, except in the case of a direct sale. Shipping marks and destination are taken from Fig. 1 and the date shipped is put in when the machine leaves the factory. When the whole lot has been shipped the lot record as it finally stands is copied in ink for permanent record.

The forms described so far may be called primary records. From them various secondary records are made out to bring out more clearly certain data. For instance, the 4 x 6-in. card of Fig. 4 is made out with amounts of orders and shipments in dollars for each agency office. There is also a similar card showing the total business of the dealer in all his offices. The card shown in Fig. 5 gives the annual record of the dealer in dollars.

Annual dealer records in numbers of machines instead of in dollars are shown on the 5 x 8-in. cards of Figs. 6 and 7, Fig. 6 showing uprights and Fig. 7 showing radials.

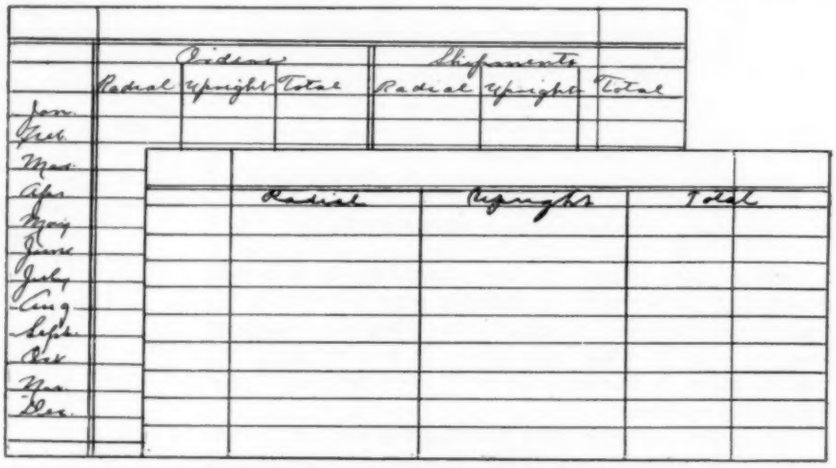


FIG. 4 (ABOVE). AGENCY RECORD IN DOLLARS BY MONTHS. FIG. 5 (BELOW). AGENCY RECORD IN DOLLARS BY YEARS

Another useful card file is made up from the primary

LOT RECORD

Size	Style of Machine	Style Counter	Lot No.	Mach. No.	Name of Purchaser	Address of Purchaser	Shipping Marks or Numbers	Date Shipped

FIG. 3. LOT RECORD SHEET

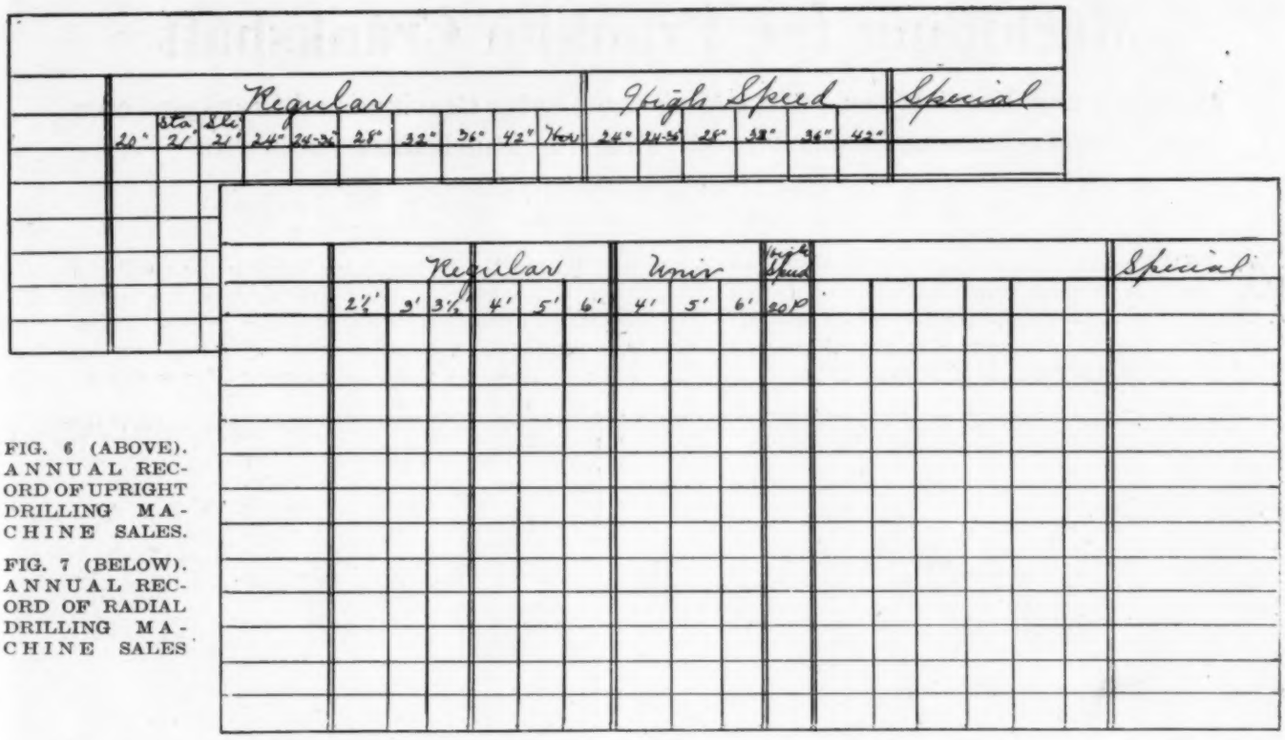


FIG. 6 (ABOVE). ANNUAL RECORD OF UPRIGHT DRILLING MACHINE SALES.

FIG. 7 (BELOW). ANNUAL RECORD OF RADIAL DRILLING MACHINE SALES

records on the tabbed 3 x 5-in. cards of the kind shown in Fig. 8. The cards are filled in at the end of each month and show the machines sold to a firm during the month. As will be seen from the illustration the

TOWN | STATE

FIRM

STYLE MACHINE	No.	BY WHOM SOLD	DATE

E 36288-T

FIG. 8. SALES RECORD FOR GEOGRAPHICAL FILING

cards are arranged to be filed geographically. They are useful in keeping a check on what the dealer is selling in any given district. They are also valuable in locating the machine number when a customer sends in for repair parts without giving the number in his correspondence.

Finally there is the agency record made out on a 12 x 19-in. sheet with the headings shown in Fig. 9. Two separate records are kept on this form, the first of which is a sort of day book in which a record of each machine sold by the agency is entered as the shipment is made. From this sheet it is easy to watch the volume of business turned in by each agency office.

A more interesting comparative record is obtained by rearranging the items on the big sheet so that the orders are grouped by cities. It is immediately evident from this record whether an agent is making good in one city or falling down in another, for his sales over a period of years are all there so that they may easily be compared. If more tools are being sold in a small city than in a big one there must be some reason, or if $100,000 worth of machines were sold in this city in 1920 and only $5,000 worth in 1921, it may be worth while to find out why.

On the whole we find these records invaluable in our business. In case of dispute over territory or results, with any agent or between two agents, we have the records at hand and can show the facts in the case at a few minutes' notice.

AGENCY RECORD

NAME LOCATION YEAR

MONTH	CUSTOMER	ADDRESS	Quantity	DESCRIPTION	UPRIGHTS	RADIALS	SPECIALS	TOTALS

FIG. 9. AGENCY SALES RECORD SHEET

Machining the Franklin Crankshaft

Machines and Methods Used in Turning the Center Bearings and Crankpins on a Seven-Bearing Crankshaft—Drilling for Lubrication—Balancing

By FRED H. COLVIN
Editor, American Machinist

As THE Franklin motor uses a seven-bearing crankshaft, it presents somewhat more of a machining problem than some other designs of shafts. After the forging, heat-treating and straightening operations, the crankshafts are turned on Wickes lathes as seen in Figs. 1, 2 and 3. The first illustration shows the turning of the three central bearings, the shaft being driven from both ends and the three bearings turned at once, together with the facing of the cheeks on the sides. This can, perhaps, be better understood by referring to Fig. 2 which shows the lathe with the crankshaft removed and gives a good idea of the driving heads *A* and *B*, and their clamps for holding the shafts in position. The turning tools are held in the substantial holders shown at *C*, while the side or web facing tools are shown at *D*. The web facing cutters are set at a suitable angle to make adjustments for width on easy matter. The lathe is provided with a spacing bar *E*, which allows the carriage to be easily located for different bearings on the shaft. In Fig. 3 are shown the second and fifth crankpins being turned in a similar lathe, and also the holding fixture used, in considerable detail, as well as the diameter stop at *A*. Drilling the oil holes, which form such an important part of a forced feed lubrication system, is accomplished in the battery of three machines, shown in Fig. 4. These machines have special drilling heads, and fixtures which hold the crankshaft at the desired angle and in the proper position for

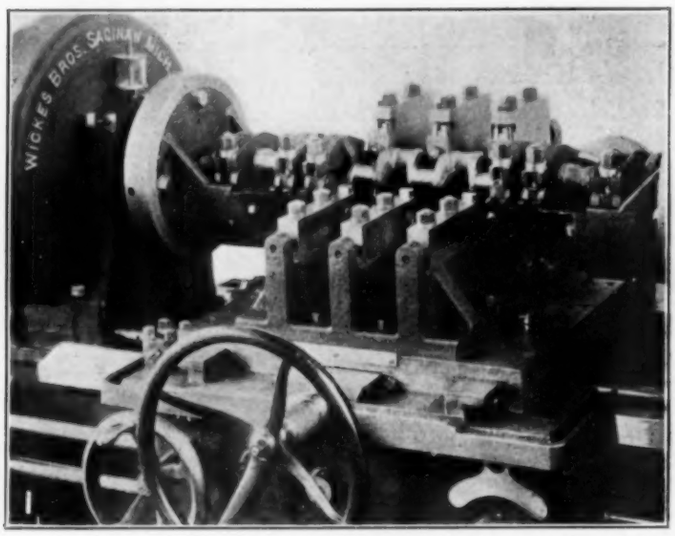


FIG. 1. TURNING THE THREE CENTER BEARINGS.

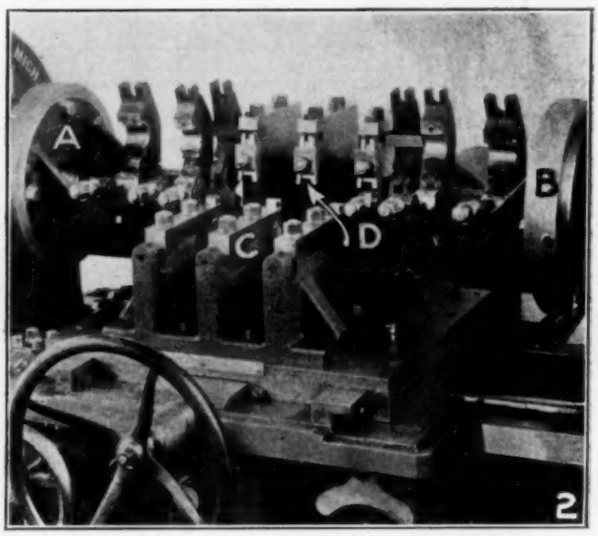


FIG. 2. LATHE EMPTIED TO SHOW TOOLS

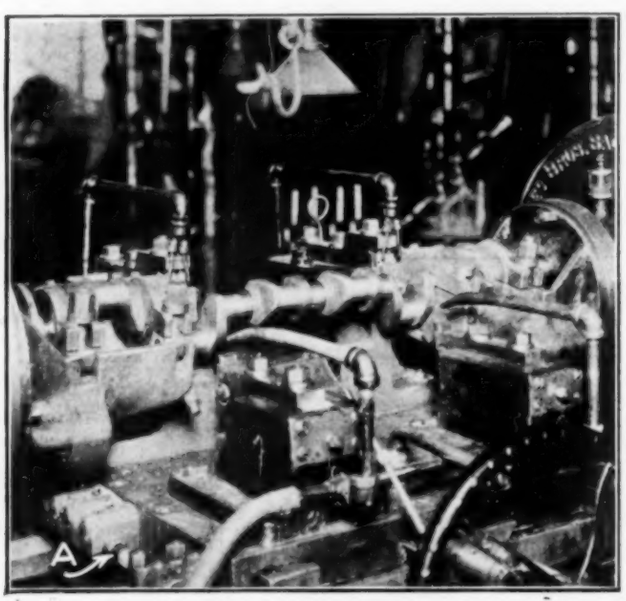


FIG. 3. TURNING THE CRANKPIN

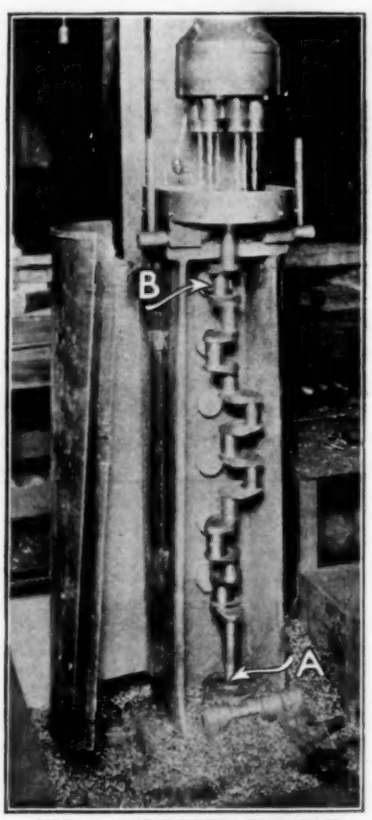


FIG. 5. DRILLING THE END FLANGE

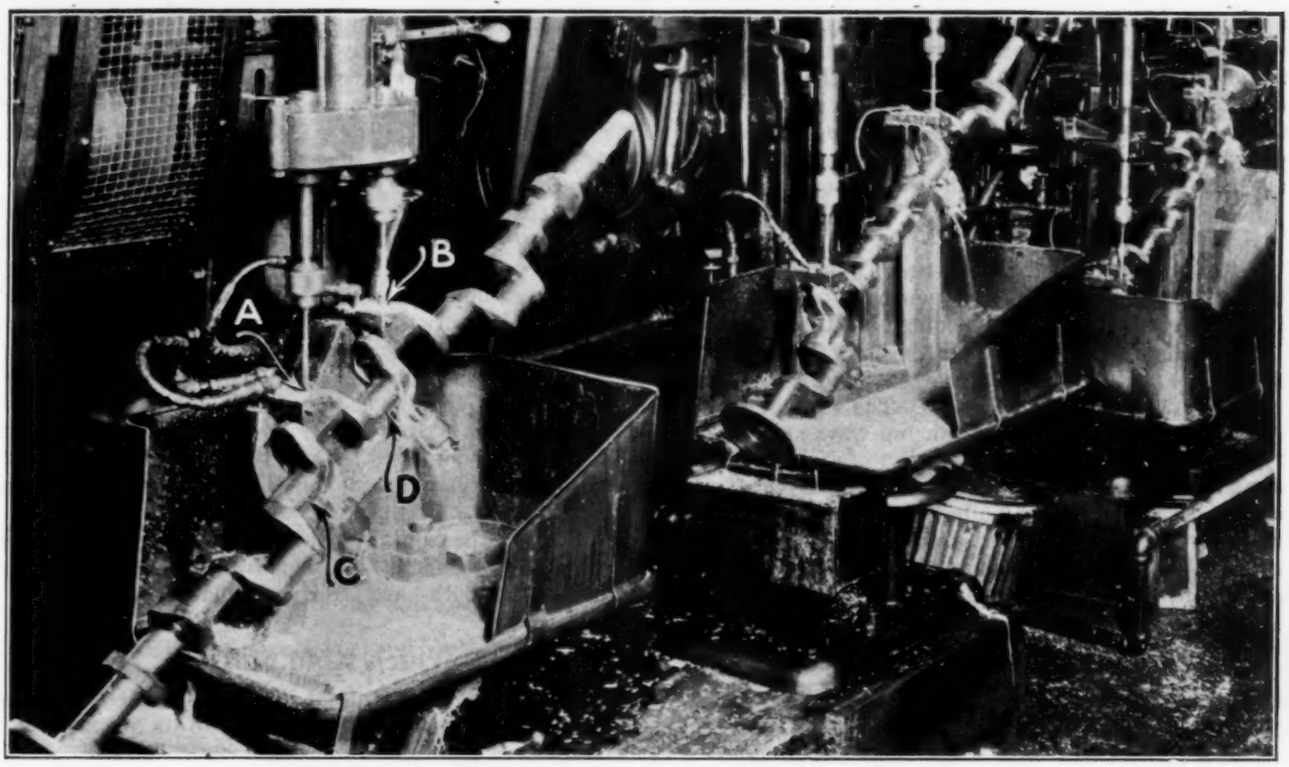


FIG. 4. DRILLING THE OIL DUCTS IN THE BEARINGS

the different holes. Referring to the machine at the left, the different lengths of drilling spindles can be seen, although both are driven from a single head. The guiding bushings *A* and *B* start the drills through the third and fourth crankpins and guide them through the crankpins, through the webs and out through the main bearings of *C* and *D*. As the oil pump forces lubricant through every main bearing, these holes must guide the oil direct to the adjoining crankpin to insure positive lubrication at all times.

In a similar way the second machine drills the holes in the second and fifth crank pins, and through the web to the adjoining bearings. In the last operation (on the third machine) the crankshaft has been reversed so that the holes are drilled in the opposite direction to that in crankpins one and six. Thus six crankpins and six of the seven main bearings are drilled. The end bearing receives oil direct from the pump, but does not feed any other bearings. This method of drilling the crankshaft is very simple and satisfactory and has facilitated production.

Drilling the flange at the end of the crankshaft is

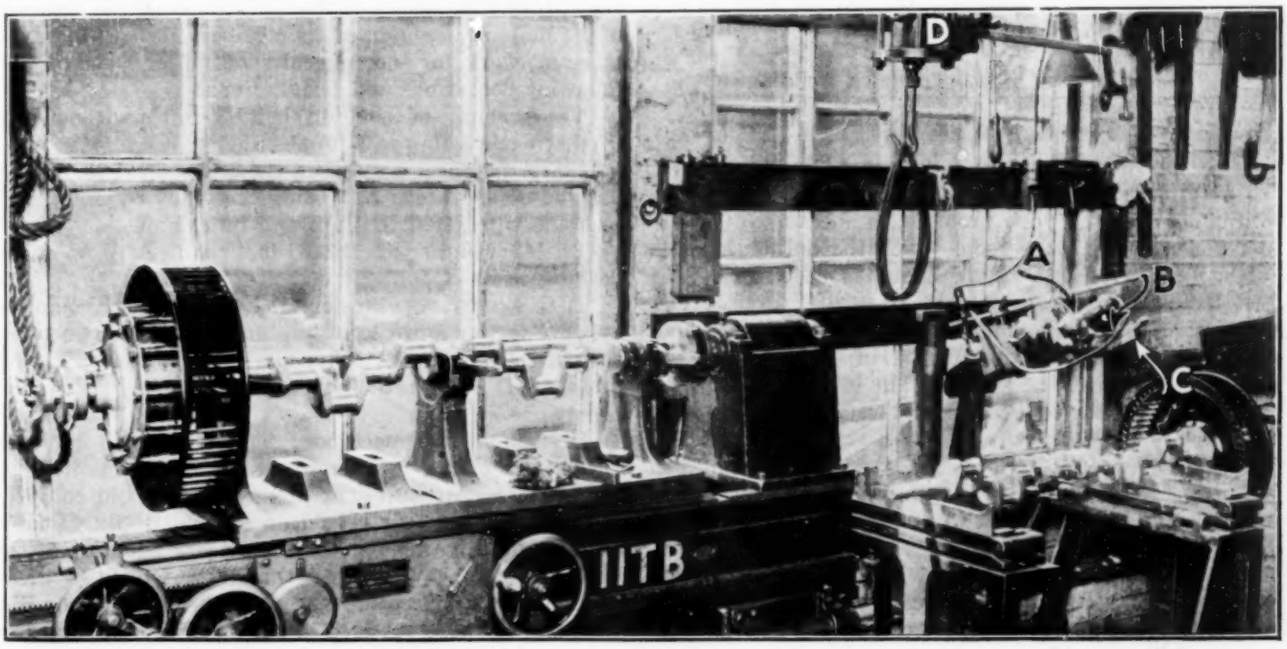


FIG. 6. STATIC AND DYNAMIC BALANCING OF COMPLETE CRANKSHAFT

accomplished with the simple fixture shown in Fig. 5, which consists of a special drilling head having six spindles and a box form of fixture with an enclosing cover. The lower end of the crankshaft rests on a center at *A*, while the upper end is positioned by a suitable centering device, as well as the steadying fork *B*. The six holes in the flange are drilled in one operation.

Balancing the Complete Crankshaft

After the crankshaft has been finish-ground, the Sirocco fan, which is one of the main features of the Franklin cooling system, is mounted on it, together with the couplings which go back to the first universal joint. The whole unit is then given both a standing and a running balance, as shown in Fig. 6. The standing balance is given on the stationary balancing ways shown at the right, these ways being adjustable in both directions so as to make it easily possible to keep them level and lined up at all times. Conveniently mounted over the balancing ways, is the portable electric drill, shown at *A*, by which excess metal can readily be drilled out from any point, should this be found necessary in the static balance. The drill itself can be seen at *B*, and the supporting arm, or "old man" at *C*.

Then the whole unit is carefully lifted by means of the hoist at *D*, and swung over into the Carwen dynamic balancing machine shown at the left. Here the running balance is carefully tested, and when satisfactory the crankshaft is ready to be assembled with the other motor parts. It will be noted that the balancing is done with the universal spider, grease cup, and other small parts in place, so as to insure satisfactory service in the completed motor.

Amortization of Plant Facilities

By Page Golsan
Ford, Bacon & Davis, Inc.

I have just read with a great deal of interest Mr. Figsby's article, "Amortization of Plant Facilities," on page 482 of American Machinist. Mr. Figsby has very clearly expressed the situation. However, I wish to call your attention to the subhead of his article reading as follows:

> "Regulations 62 of the Treasury Department Give Manufacturers Another Chance to File Claim—Substantial Relief Available Under Little-Understood Provision."

I am of the opinion that this subheading was placed over his article by your proofreader, because it is not in accordance with the facts which the author has set forth. The Treasury Department has no authority to give manufacturers any "chances" to file claims. The permission to file a claim and the dates of limitations therefor are specifically set forth in the Revenue Act quoted at length in the article. The law states that the claim shall be allowed "if claim therefor was made at the time of filing return for the taxable year 1918, 1919, 1920, or 1921." The Treasury Department has permitted the filing of 1921 returns in tentative form on March 15, 1922, subject to final revision by June 15, 1922. A literal interpretation of the law, therefore, makes it mandatory that some sort of amortization claim shall have been filed at least by March 15, 1922, and if this has not been done I cannot see how another "chance" is available.

The law specifically states that revisions of these claims may be made at any time "before March 3, 1924." This is clearly set out by Mr. Figsby in his last paragraph. However, the manufacturer is in a position to revise only if "he has come under the wire" by having filed some form of claim in accordance with the law's dates of limitation. I take this occasion to write you along these lines that your heading be not misleading.

You further state that the question of amortization is little understood. I must differ with you on this account for in our work along these lines we have found a very high understanding of the subject by the officers of companies entitled to these considerations. In general, the only question has been as to the method of determining value-in-use. This value, as Mr. Figsby outlines, is a definite engineering problem and subject to solution only from that viewpoint. You would not call in an accountant to tell you how much a power plant was worth. That is an engineer's business. On the other hand, the setting up of tax returns and the determination of the capital amounts to be amortized are the accountant's business. In preparaing the final claim for amortization both have their particular field.

Which Kind of Ton?

The American Institute of Weights and Measures has issued the following letter addressed to its members and friends:

"In the English system of weights and measures the 'ton' has two values: The 'Long ton' of 2,240 lb. and the 'Short' ton of 2,000 pounds.

"The critics of the English system make the most of this element of uncertainty as to tons. We have found, also, that there is a rather prevalent feeling among manufacturers and others that this duality of 'tons' is fairly open to criticism as objectionable.

"However, it is apparent that the real basis of the objection is not so much that we have two kinds of tons, as that they have not been easily designated or distinguished in common usage.

"In order to meet this situation in as simple a manner as possible and to minimize misunderstandings in the use of these two values of the 'ton,' the institute, subject to the majority opinion of its members, desires to advocate and work for the general adoption and use of the following definitions and designations:

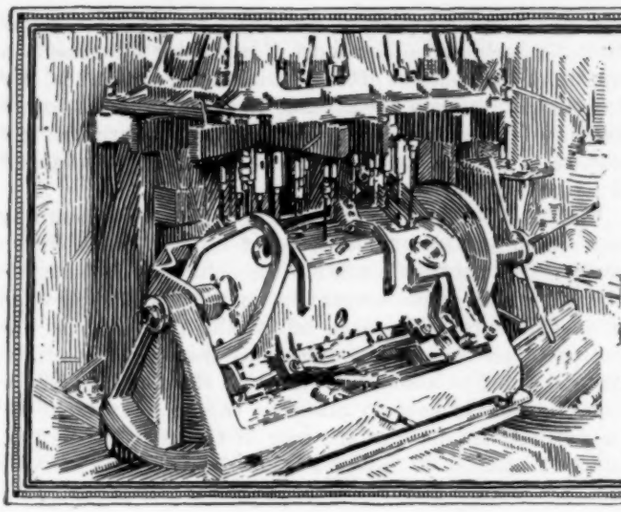
(1) A weight of 2,000 lb. shall be known without any further designation as a 'ton.'

If circumstances demand it, the ton of 2,000 lb. can be designated as 'S-ton,' this being especially recommended in trade with Great Britain and its colonies.

(2) A weight of 2,240 lb. shall ALWAYS be designated as 'L-ton' (Pronounced Ell-ton).

"If in sympathy with our aims, you or your company approve of this move, kindly return to us in the enclosed stamped envelope the lower part of this sheet signed and dated; if you do not approve kindly state your objections."

All men in the machinery industry should consider themselves as the friends of the American Institute of Weights and Measures, or at any rate should consider the institute as their friend on account of its valuable work in fighting against the compulsory adoption of the metric system. We suggest that this problem be given immediate consideration and that the approval or disapproval of those engaged in the machinery industry be sent to C. C. Stutz, secretary of the institute, 115 Broadway, New York.



Tool Engineering

By
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President and Chief Engineer
Dowd Engineering Company, New York City

Attachments for Turret Lathes—Factors Influencing the Design—Duplex Attachment for Turret—Forming and Generating Tools for Taper Turning and Boring

TAPERED and curved surfaces, both external and internal, often require special attachments in order to machine them accurately. Inside forms when of small diameter are often machined by the use of tapered or formed reamers; large diameters by a flat tool of correct shape, or by means of a generating attachment so arranged as to cause a single-point tool to travel along the taper or the form of the contour. Outside contours may be produced by a formed tool on the turret or cross-slide, or by means of an attachment using a single-point tool so arranged that it will follow a specified form and reproduce this on the work. Attachments for producing angular and curved surfaces are applied in many kinds of manufacturing work to engine or turret lathes. They are often used in combination with other tools for turning, boring and facing; and they may be operated simultaneously or separately, according to the requirements of the work.

Tapered and curved surfaces do not always require a generating action to produce them within the required limits of accuracy. For small work, forming tools of various kinds or tapered reamers can often be used with success on certain kinds of materials, such as cast iron, brass and steel of low carbon content. Alloy steels containing nickel and chromium usually require a generating attachment with a single-point tool, because the "wirey" character of the material does not lend itself readily to formed cuts with wide-faced tools.

Conditions occasionally require more tools than the turret faces will permit; and in such cases it may be necessary to design a special attachment to be applied to the face of the turret, such that two or more tools can be used by indexing the attachment. This procedure is not necessary very often, but there are times when a special attachment can be used to advantage and thus avoid the necessity of an extra operation. Several important points in connection with the design of attachments are given in the following paragraphs.

1. The material to be cut determines to some extent whether a generating tool is required or whether simple forming tools can be used. This matter should, therefore, be considered first, as it is a determining factor in the design. The accuracy required is also important; and for a rough job requiring only a clearance cut, a simple forming tool can sometimes be used even if the material is unsuited to this kind of cutting.

2. The number of pieces to be machined is important, as on small production it hardly pays to design a generating attachment unless great accuracy is required. Therefore, the simple formed tool will often be found more economical on low-production work.

3. The type of machine used should be selected with care, always considering any other operations which can be performed in the same setting. When a form cut is to be made that cannot be combined with any other operations, it is often possible to adapt an old engine lathe, applying to it the necessary forming or generating attachment. Attention should always be paid to the type of machine most suitable, in order to combine operations and obtain maximum efficiency in this way. Before attempting to design any generating or forming attachment, complete data should be obtained regarding sizes of the various parts of the machine to which the attachment is to be applied.

4. The rigidity of any tool used in production is an important factor. This is a point which is often overlooked in design; and as a consequence very light cuts must be taken in order to avoid chatter, and much time is therefore lost. Sliding or moving members must be rigidly supported and of sufficient section to withstand the cutting strains. A generating or forming attachment usually has moving parts which must operate freely, yet at the same time there should be no looseness or weak members which would tend to cause vibration.

5. The convenience of the operator should be studied when designing fixtures. In connection with the setting of the tools and the adjustment of them, the setscrews should be suitably placed so that they are easy of access. If tapers are to be produced by a generating attachment, the taper bar should be easily accessible; if adjustable, suitable provision should be made so that proper measurements can be taken of the angle of the taper. Other points in connection with convenience of operation will be taken up during the treatment of taper and forming attachments.

6. The flexibility and up-keep of generating attach-

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ments should be very carefully considered when designing. There are cases when a tool must be designed to operate in a confined situation, and where there is little

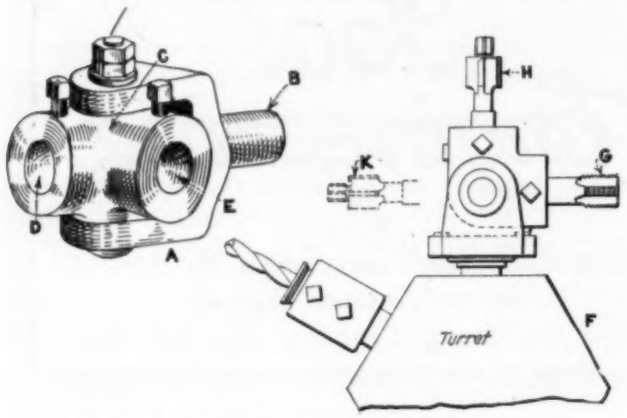


FIG. 355. ATTACHMENT TO HOLD TWO TOOLS ON ONE TURRET FACE

chance to make it adjustable so that other sizes can be handled. In many instances, however, a little forethought on the part of the designer will enable him to design the attachment so that it can be used for a considerable range of work. It is very disappointing to find that a slight change in the design of the part requires an entirely new generating fixture, particularly if it appears that the tool could originally have been designed with greater latitude and at practically no more cost.

In providing for up-keep, it is important to make sure that all surfaces subject to wear should be so arranged that replacements are possible, in order that the tools can be kept in good condition for a long period of time. Adjustable gibbing should be provided wherever necessary. The cutting tool itself should be conveniently replaceable, and a suitable gage should be furnished for setting it to the correct size if the conditions of the work require it.

Duplex Attachment

Mention has been made of the occasional necessity of using more than one tool on a single turret face. While this condition is not often found, yet it is frequent enough to deserve consideration. When the addition of one tool to a turret "set-up" will avoid the necessity for a second operation, it is obvious that a considerable saving can be effected by the use of an attachment which will permit the extra tool to be used along with the others.

In Fig. 355 is shown an attachment of this kind at *A*. The body of the tool is furnished with a shank *B* which fits the turret hole. An indexing member *C* is held in the body of the tool in such a way that it can be readily indexed. Two holes are provided at *D* and *E* to receive the tools required. The illustration at *F* shows the application of the device to a turret set-up. The tap *G* and counterbore *H* can be used progressively on a single turret face. The dotted lines at *K* indicate the position of the counterbore while the tap is being used. A 90-deg. indexing movement is used on this attachment, and suitable stops and an index pin are provided to give the correct location when indexing.

Mention has been made of the possibilities of forming certain kinds of materials with a plain forming tool. We have taken up previously the design of circular forming tools and other tools of a similar kind used on the cross-slide. It is often possible to design a tool for taper work in such a way that it can be applied to the turret of the machine. Tools of this nature are not generally adapted to alloy steels or other materials of a tough and "wirey" nature.

In Fig. 356 is illustrated the application of roughing and finishing tools for a piece of tapered work shown at *B*. The holder *C* is a casting which is fastened to the turret in some convenient manner. The forward end of this body is faced off at the rear so that the cutter *D* can be mounted upon it as shown. Adjustment for diameter is allowed by the two slots at *E*, and the cutter blade is held in place by the setscrews *F*. By mounting the cutter at the rear of the body of the tool, all of the thrust of the cut is taken by the solid member and no great strain is imposed on the setscrews. The

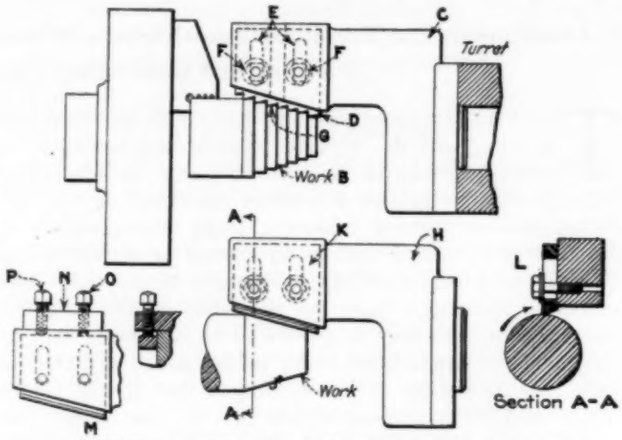


FIG. 356. TAPER-FORMING TOOLS ON TURRET

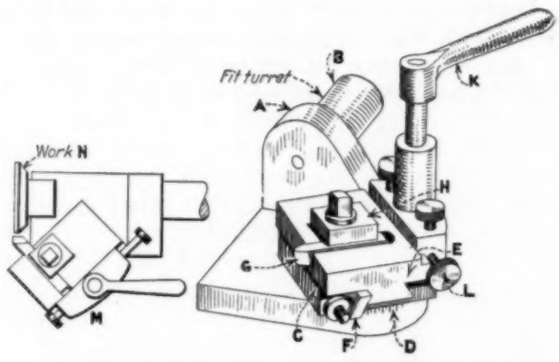


FIG. 357. ADJUSTABLE TAPER-TURNING TOOL

angular edge of the tool is serrated at *G* so as to make the cutting action easier and break up the chip.

The finish operation on the taper is done by a tool of similar form, shown at *H*. The body of this tool contains a single cutter blade *K*, which has a plain edge for finishing the work. The adjustment of the tool is made in the same manner as that previously mentioned. The sectional view at *L* illustrates the simplicity of this design, but it will be evident that no provision is made for fine adjustment, the operator being obliged to adjust the tool by the "sledge-hammer" method. Both roughing and finishing tools are tongued, so that they fit the tool body and are thus kept in alignment.

A refinement of this design which permits more accurate adjustment to be made, is shown at *M*. A plate

N is fitted to the top of the block, and contains two adjusting screws *O* and *P* by means of which the cutter can be readily adjusted to a given diameter. This type of taper forming tool is simple in design and economical in manufacture. For low-production work on suitable materials it can often be used to advantage.

Adjustable Taper-Turning Tools

For light cutting when it is not necessary to remove a great amount of stock and when the work is of small diameter, an adjustable turning tool like that shown in Fig. 357 will often be found useful. The holder *A* has a shank *B* which fits the turret hole. On the body of the tool a swiveling unit *C* is mounted so that it can be swung and clamped in different positions, according to the angle of taper required. The body of the tool is graduated at *D* to assist in setting. The member *E* is dovetailed to fit the swiveling member *C* and an adjustable gib is provided at *F* in order to take up wear. The tool *G* is conveniently mounted in the slide *E* and clamped in place by means of a strap *H*. The slide is moved by means of a rack and pinion, the latter being operated by a handle *K*. The device is furnished with an adjustable stop *L*, which can be set to control the travel of the slide.

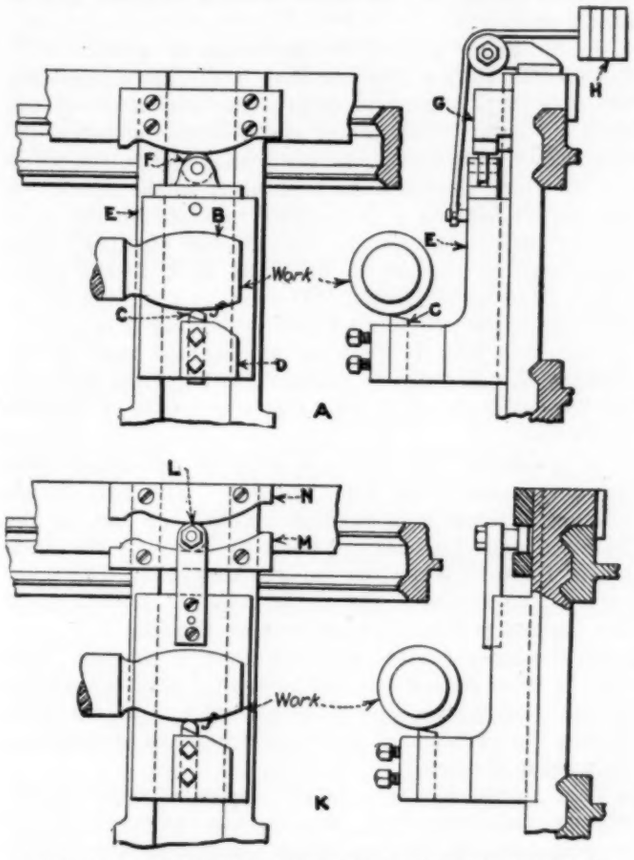


FIG. 358. FORMING BY THE GENERATING METHOD

The application of this tool is shown at *M;* the work *N* has a short and blunt taper cut on it. It is necessary only to adjust the swivel to the correct angle and operate the slide by hand when generating the taper. The advantage of this tool is in the adjustable feature, and also in the fact that it is a self-contained unit which does not interfere with any other tools. For certain kinds of work where the same taper is to be produced continually, a device of this kind can be made up without the swivel member. The taper of the slide is made to suit the work for which it is intended. This simplifies the construction slightly, but there is no chance for adjustment.

When forming or generating attachments are used, there is generally a spring or weight by means of which the roller or follower is kept in contact with the form which is to be reproduced. The direction in which the pressure is applied is important, and there are many forming attachments designed which are incorrect in principle, yet which will many times produce good work if the material being cut is not too hard. The form which controls the shape of the cut should be so placed that the follower can never lose contact with it under any circumstances.

This matter is illustrated in Fig. 358, and the principles shown there should be clearly understood before attempting to design forming attachments. In the example at *A* the work *B* has a curved contour, which is to be generated. The tool *C* is held in a block *D* mounted on a floating slide *E*. At the end of this slide there is a roller *F*, which is kept in contact with the form *G* by means of a weight *H* or a stiff spring. If this weight should not be sufficiently heavy to keep the roll in contact with the form at all times, the tool *C* might be forced out of its position due to the hardness of the material, so that a true contour would not be obtained. If the work to be machined is a casting and many hard spots are encountered, the finished work is especially likely to be inaccurate.

A method which can be depended upon to reproduce the form accurately, no matter whether the work is hard or soft, is shown at *K*. In this case the pressure is applied against the roll in the direction indicated by the arrow at *L*, so that the roll is continually against the plate *M*. There is a guard plate *N* used simply to prevent any drawing-in action of the tool into the work. This guard plate is seldom necessary, except in cases of very severe cutting or where the pressure of the cut, due to its shape, is likely to overcome the pressure of the spring or weight. The pressure of the work against the tool assists the spring or weight to keep the roll in contact with the form *M*, so that an accurate shape is produced.

In considering the use of springs or weights, it will generally be found more convenient to use springs, as they are less likely to be in the way. The springs should be proportioned so that they will give sufficient pres-

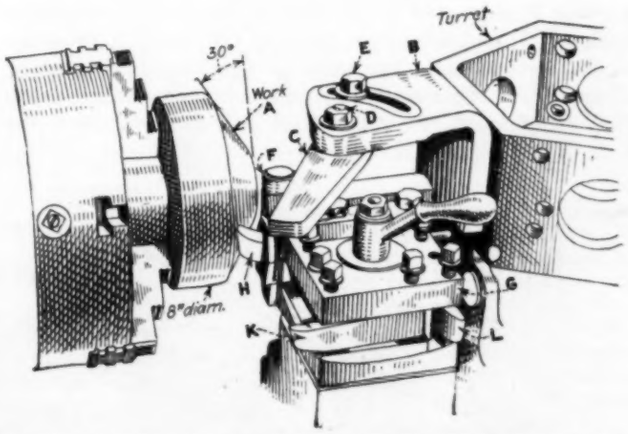


FIG. 359. SIMPLE METHOD OF GENERATING A TAPER

sure to hold the roll firmly against the form plate. The principles indicated in this illustration are fundamental in their nature and are not to be considered as hard and fast rules. For various reasons it may be found necessary to make forming attachments which are not strictly correct in principle, yet which will give good results under the conditions where they are used. The designer must be governed by the shape of the form and the amount of material to be removed.

Generating a Taper

The method used for generating any sort of a taper should avoid tying up the machine so completely that other tools cannot be used. It is possible to prevent this trouble by employing a very simple arrangement, such as that shown in Fig. 359. The work *A* has a 30-deg. angular surface, which is to be turned, but which is too wide to machine properly with a flat-blade tool.

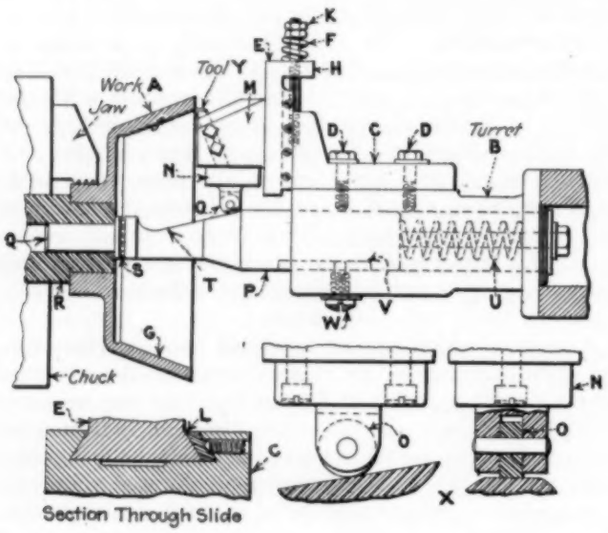


FIG. 360. GENERATING TOOL FOR BORING TAPER HOLE

As other tools are to be used in connection with the turning operation, it is desirable to leave the turret and cross-slide free, so that they can be used for other tools. A bracket *B* is mounted on one of the faces of the turret.

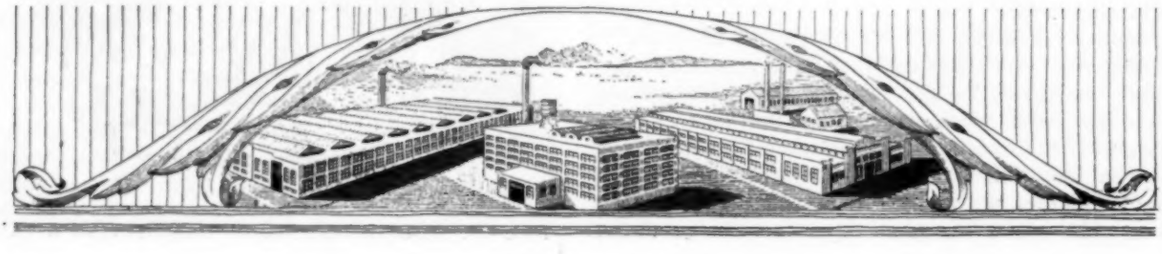
To the under side of this bracket a hardened steel plate C is adjustably fastened. This plate pivots on the bolt *D*, and it can be set to any angle within its capacity after loosening the nut *E*. A special holder carrying a roller *F* is located in one face of the cross-slide turret toolpost *G*, and a tool for turning the taper is provided at *H*. Other tools are used in the turret toolpost at *K* and *L* for other operations on the work. When using this attachment, the roller *F* is held firmly against the side of the plate *C* and the crossfeed of the machine is thrown into engagement, thus causing the tool to travel along the angle at which the taper plate is set. An arrangement of this sort will be found very convenient for many kinds of taper work and its simplicity and ease of adjustment make it extremely useful.

Holes of large diameter which are to be bored to a taper are most conveniently machined by means of a taper attachment. An example of this kind is shown at *A* in Fig. 360. The inside surface *G* is to be bored to an angle of 20 deg., and it would not be good practice to attempt to do this with a flat-blade tool or anything in the nature of a reamer. The holder *B* is mounted on the face of the turret, and on the upper face of it the bracket *C* is fastened, being held in place by four bolts *D*. The slide *E* is fitted to a dovetail on the face of the bracket *C*, and the spring *F* exerts pressure on the overhanging lug *H*. The amount of this pressure can be regulated by adjusting the locknuts at *K*. A sectional detail of the slide with a tapered gib is shown at *L*.

On the under side of the toolholder *M* a block *N* is fastened in such a position that it carries a hardened roller *O* that is used to control the movement of the slide. A detail of the roller and holder is shown at *X*. The body of the tool *B* carries a pilot bar *P*, the small end of which *Q* enters the bushing *R* in the chuck. A ball thrust bearing *S* is suitably mounted on the pilot bar so that it strikes the face of the bushing. The upper part of the bar is cut away at *T* to the angle which is to be generated. The bar is a sliding fit in the body of the tool, and a heavy coil spring *U* is utilized to keep the pilot in position against the face of the bushing *R*. In order to prevent the bar from turning, the keyway is cut at *V* and a special screw *W* is inserted in the slot.

In operation, the device is entirely automatic after the turret feed has been engaged. The ball thrust bearing *S* remains in position against the face of the bushing, and the body of the tool carrying the slide moves forward while the bar remains still. The pressure of the spring *F* forces the roller *O* down against the tapered portion *T*, thus causing the tool *Y* to generate the taper according to the angle on the bar. This type of taper boring tool can be applied to either a hand or automatic machine. Adjustments for diameter within the capacity of the attachment are easily made by moving the tool.

Care should be taken in the design of tools of this sort to make sure that all parts are sufficiently heavy to withstand the cutting action. Replacements of tools should be provided for, and readjustments for wear. The pilot and thrust bearing are very important, as the former assists greatly in supporting the tool, while the latter reduces friction. Bars having different tapers can be substituted for the one shown if it is desired to cut other angles.



Shall We Standardize Tapers?

The Opinions of Many Firms Making and Using Tapered Members—Nearly All Want a Standard—What Shall It Be?

THE standardization of any machine part involves numerous problems. A very few oppose all standardization; more want to standardize on the particular thing they are using and some are willing to adopt whatever the majority consider best for the purpose. Nearly everyone admits the desirability of uniform practice, not so much for interchangeability of tools as to avoid confusion and the necessity of numerous gages, and to reduce the number of tools to be carried in stock.

The question of a standard taper for machine tools was broached some time ago and a canvas of machine-tool builders and users yielded some interesting results. With three or four exceptions all believed a single standard was desirable. A number doubted that it could be secured except at a prohibitive cost, while a few considered it worth almost any price, providing its adoption could be gradual and the cost spread over a few years.

The Morse taper has by far the most advocates, particularly for drilling machine and lathe use, while the Brown & Sharpe taper holds the lead for milling machine use. Much of this preference for the Morse taper is due to its wide-spread use on drill shanks, although it was perhaps the most criticized of any on account of the varying degrees of taper used in the different sizes.

The Jarno taper has many friends but few users. Those who use it, however, find it perfectly satisfactory, except for a few criticisms as to its length; in fact the length of the Brown & Sharpe taper is also criticised in a number of cases.

The simplicity of the Jarno dimensions and the logical manner of arranging the sizes, as compared with the arbitrary selecting and numbering of the others, adds greatly to its popularity. Then there are a few other tapers such as the Sellers with its key or spline instead of a tang.

The Brown & Sharpe taper is preferred for milling machine work on account of its smaller angle, holding milling cutters more securely against loosening under a cut. This, however, loses its significance on the modern milling machine as heavy-duty cutters require more than the friction of a taper shank to drive them. Draw-in rods and key drives of various kinds are being used more and more for this work.

Extracts from some of those who are interested in the standardization of tapers are of special interest and are given herewith. As some objected to being quoted, all are given without identification. They are nearly all however from representative firms in various lines and seem to fairly represent the general feeling.

Several advocate a new or compromise taper, between the Brown & Sharpe and the Morse. They object to the Jarno taper as being nearly the same as the Morse, although having the advantage of uniformity and logical sequence. A new taper would evidently add to the confusion and it would seem better, all things considered, if a change is to be made to adopt a taper already in use. This would probably favor the Morse taper in spite of its lack of uniformity. It would cause less confusion than any other change and might be an advantage in most cases. The milling machine men would be most affected and might not consider it advisable to change, but would probably do so if it seemed best for the industry.

The opinions follow:

Morse Heads the List

No. 1. We believe that this matter will narrow itself down eventually to one uniform taper, and in the case of engine lathes and turret lathes, we are firmly of the belief that the Morse taper will be adopted as the universal standard.

The more we simplify these various standards the better it will be not only for the machine tool manufacturer, but also for the buyer.

No. 2. We are very much in favor of a standardization of the tapers used in spindles of machine tools. While we do not use any tapers in the machines we manufacture ourselves, we are nevertheless users of various types of machines and believe the standardization of tapers would be very much to our advantage. We find in our experience that the Morse taper is the taper most generally used in our works and this taper would be very satisfactory to us.

No. 3. In our opinion either the Brown & Sharpe, the Morse or the Jarno tapers would make a satisfactory standard. The proportions of the Morse taper are beyond a doubt more practical than those of the Brown & Sharpe or longer standards, for the reason that the deeper the taper hole the more difficult it is to accurately machine it, yet it must be deep enough to insure the proper alignment. The Morse taper seems to fill the bill in this respect. The chief fault to find with the Morse taper is one of engineering detail, in that the taper per foot is not the same in the different sizes and the diameters at the large and small ends are not even dimensions. From a practical standpoint, to our mind, this has no real bearing as it is just as easy to make them this way as any other.

No. 4. When the subject of standard tapers was mentioned, it immediately started an argument, and we find that different people in this organization do not agree. So we imagine you are going to have your troubles in getting a general agreement. For your information, however, we might advise that our superintendent prefers the Jarno taper. Other choices are—first, the old Pratt & Whitney $\frac{2}{3}$-in., and second—Brown & Sharpe $\frac{1}{2}$-in. to the foot. Perhaps we might say that the Jarno taper seems to be in favor, as the old Pratt & Whitney and the Jarno are practically the same.

Two More for Jarno

No. 5. The Jarno 0.600-in. taper per foot would seem about right. I have heard an occasional citicism of the Brown & Sharpe $\frac{1}{2}$-in. per foot taper on the grounds of holding in tools to the extent of rupturing the metal when released. When using steep angle end mills or undercut cutters where there is a tendency to draw into the work, it is necessary to use a threaded shank or tap the shank of the cutter for a holding rod.

At first glance, it would not appear difficult or expensive to take care of a new taper in connection with drills, small cutters, etc., by one of two methods: the use of collets with the new taper externally and old taper internally, or, the better way, by regrinding and finishing all collets that could be made over into the new standard as well as the drill shanks, cutters, etc. This, of course, would mean refinished arbors and bars of all description, as well as the bore of the machines, but once this job was done the advantage would be evident.

No. 6. We think that a suitable standard should be

adopted and a standard taper per foot should be used for all sizes of work. It is our opinion that either the Brown & Sharpe taper of ½ in. per foot, or the Jarno taper of 0.600 in. per foot should be adopted. We think for milling machine construction, that the Brown & Sharpe taper of ½ in. per foot would have a little advantage over the Jarno taper, as the Brown & Sharpe taper would have a tendency to hold better and not loosen as easily as the Jarno. However, most milling machines being built today have arrangements for drawing the taper arbor securely in place. With this in mind, we cannot see why the Jarno taper could not be used just as well in milling machine constructiou. We know that it would work out O.K. as far as lathe centers are concerned. In fact, we think it would be superior in lathe construction as a lathe center is always being forced back into the taper fit. The only place where we can see there would be any trouble at all by using the Jarno taper would be in small machines where taper arbors are used with nothing to drive them but the taper fit. Furthermore, we think that there will be less confusion if the Jarno taper is adopted, as the Morse taper is quite universally used and same is very close to 0.600 in. per foot. We cannot see where there would be any serious objection to adopting this taper.

Doubts Value of One Standard

No. 7. The value of one standard taper is questionable, because of the variety of uses to which taper shank tools are put. The Brown & Sharpe taper is unquestionably superior for milling machine work, because the greater the taper the easier it is to loosen the shank in socket, due to jarring in operation; but a greater taper is more satisfactory in drilling machines and boring machines, on account of ease of extraction.

If a standard taper is adopted, it would necessarily be a compromise, and it would seem advisable to adopt the Morse in preference to any other, for the following reasons:

It is approximately half-way between the Brown & Sharpe ½-in. and the ⅝-in. used by Sellers and a few other machine tool manufacturers, although there are rare instances where tapers greater than ⅝ in. per foot are used. The use of tapers greater than ⅝ in. or even ⅝ in. per foot is very limited indeed when compared to the use of Morse or Brown & Sharpe. The Morse taper is used to a much greater extent than any other, as the more common small tools are regularly made with Morse taper, such as twist drills, machine reamers, milling machine tools and lathe centers and sockets. The Brown & Sharpe taper is used, except in few instances, on milling machine tools. While theoretically, the Jarno taper makes a strong appeal, its advantages are more or less academic, and it has certain practical disadvantages, as follows:

Its use as compared to the use of the Morse taper is very slight indeed. There are nineteen sizes covering the same range as covered by seven sizes of the Morse. This would mean the use of a corresponding number of so-called sleeves and sockets, provided it were possible to obtain small tools with Jarno taper shanks. Small tools with the Jarno taper are regularly furnished by few if any manufacturers other than Pratt & Whitney Co., and even they list a much greater number and variety of tools with Morse taper than with Jarno or any other. There is a natural disinclination to change, even when it can be shown that there is a potential profit in doing so, and, therefore, there is an added difficulty in this case when confronted with the fact that there are few regularly manufactured tools with Jarno taper shanks, because there would be problems of special prices, delays in delivery and other inconveniences such as are experienced when special tools are ordered.

Every effort would be made by us to support a single standard if one were adopted by a majority of representative machine tool manufacturers, but it is felt that no great hardship would be noticed if the Brown & Sharpe taper were continued in use for milling machines, and the Morse taper adopted for other machine tools.

No. 8. If we were all starting new, we think the Jarno taper would be the best one to adopt, as all dimensions come in eighths or tenths of an inch. This is the only reason why we prefer it. The Brown & Sharpe and Morse tapers are so well established, and there are so many manufacturers fitted with standards to produce these tapers that we would not think it advisable to change to a new standard that has not any advantages other than even figures. We agree that the Morse taper would be proper for lathe spindles, but think it is bad practice to use drills in footstock spindles.

The Morse and Jarno tapers are so nearly alike, that it might be possible to use the Morse drills in the Jarno spindle and do no more damage than if it was a Morse spindle. To be sure that Morse taper drills will not be put into spindles there would have to be more of a difference than there is betwen a Morse and a Jarno taper. Our unbiased opinion is that it would be best to continue with the Morse taper on lathe spindles.

No. 9. The drilling machine manufacturers use the Morse taper; the twist drill manufacturers use the same, and it is also used on lathes to a very great extent. Much manufacturing is based on using the Morse taper and to make a change to one of the others would certainly involve more than the happy thought that it would be good if such a change were made. Then again, there are other manufacturers who use the Brown & Sharpe taper and they would feel the same way about it.

No. 10. We use mostly Brown & Sharpe and Morse tapers but feel that one or the other should be adopted as a standard taper. In fact, we also believe that all machine tools, especially engine lathes, should be more standardized. As for instance—the swing of the lathe and the weights and dimensions, so that customers would know what size lathes they are really buying.

No. 11. All of our milling machines and gear cutters are equipped with the Brown & Sharpe taper. All of our drilling machinery, lathe spindles and floor type of boring machines have the Morse taper. In as much as it is not necessary in our plant to exchange any equipment between these two types of machines, we never experience any difficulty and it would seem to us that as these tapers are more or less of an old standard, it might be well to stick to them.

No. 12. So far as the style of taper is concerned, the leading makes of milling machines are quite well established on the Brown & Sharpe standard. There is, however, no standardization as between different sizes of milling machines, so that there can be no free interchangeability of tools and arbors on milling machines of the same make but of different size.

The adoption of a standard taper hole in the spindle is not sufficient to enable free interchangeability or arbors, unless the spindle noses are also standardized, since it is now quite common practice to provide arbors with a clutch drive, and unless the clutch drive fits the spindle nose, it of course, cannot be used no matter if the taper on the arbor is exactly the same standard as the taper in the spindle of the machine.

Opposes Standardization

No. 13. What would be gained by having the tapers of all milling machines and lathes exactly the same? Nothing except that it might be a little handier for the users of different kinds of tools. In a milling room of course they could use the arbors of one machine on another, etc., but the life of the machine tool business is the fact that it is not similar in design. The salesman has a good talking point if he has a machine that is just a little different from the other fellow's. The nearer we come to the same design in various ways the less ginger there would be in the business. The slight discommodity caused by having in any factory various designs of tools, is not worth giving consideration.

I am not in for unformity in this particular line in any way, shape or form. I believe in going ahead and thinking as you please and bringing out somthing radically different from anyone else. This applies to the depth of bed of the machine, the height from the table to the cutting tool and various other things in connection with the machine that would be just the reverse from my neighbor's product.

(To be continued in next week's issue.)

Tools and Methods in a Railroad Shop

A Grooving Tool for Locomotive Pistons—A Set of Spiral Crosshead Reamers—Scarfing and Other Tools—Washout Plugs and Taps

SPECIAL CORRESPONDENCE

THE line drawing, Fig. 1, shows a piston grooving tool of the gang type. The toolholder is made to fit the toolslide on the lathe carriage and carries three $\frac{7}{16}$-in. blades or cutters and three at the opposite end which are $\frac{3}{8}$ in. wide. These grooving tools are of high-speed steel; the filling blocks and wedges are of tool steel and all other parts are of machine steel.

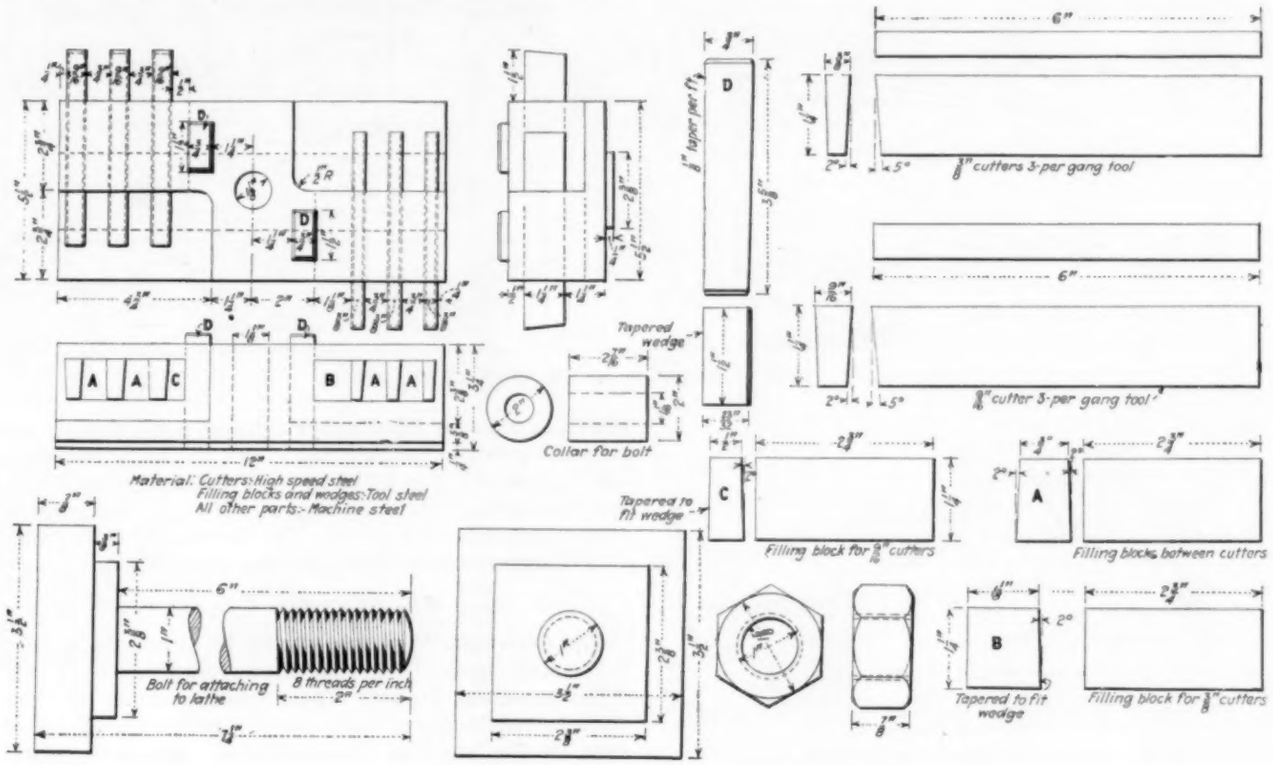

Material: Cutters: High speed steel
Filling blocks and wedges: Tool steel
All other parts: Machine steel
Collar for bolt
Tapered wedge
Tapered to fit wedge
Filling block for 3/8" cutters
Filling blocks between cutters
Bolt for attaching to lathe
8 threads per inch
Tapered to fit wedge
Filling block for 3/8" cutters
3/8" cutters 3-per gang tool
3/8" cutter 3-per gang tool

FIG. 1. GANG TOOL FOR GROOVING PISTONS

The toolblock or holder has a $1\frac{1}{8}$-in. hole bored through its center for the upright bolt by which it is attached to the lathe. The underside of the holder is made with a tongue for the regular toolpost slot in the top of the slide. The cutters are made with a 2-deg. taper on each side for side clearance and are ground at the ends to a 5-deg. front rake. The filling blocks or spacers *A* between the cutters are made with 2-deg. taper at the sides in the reverse direction from the cutter slope to fit properly between the cutters, and the inner filling blocks *B* and *C* are similarly tapered on their faces where they match the cutter sides, while their opposite or inner sides are tapered to correspond to the wedges *D*, which serve to lock each gang of blades firmly together. These two wedges *D*, as will be seen, are driven down from the top of the holder into rectangular slots cut vertically through the body of the holder. All dimensions are given on the drawing.

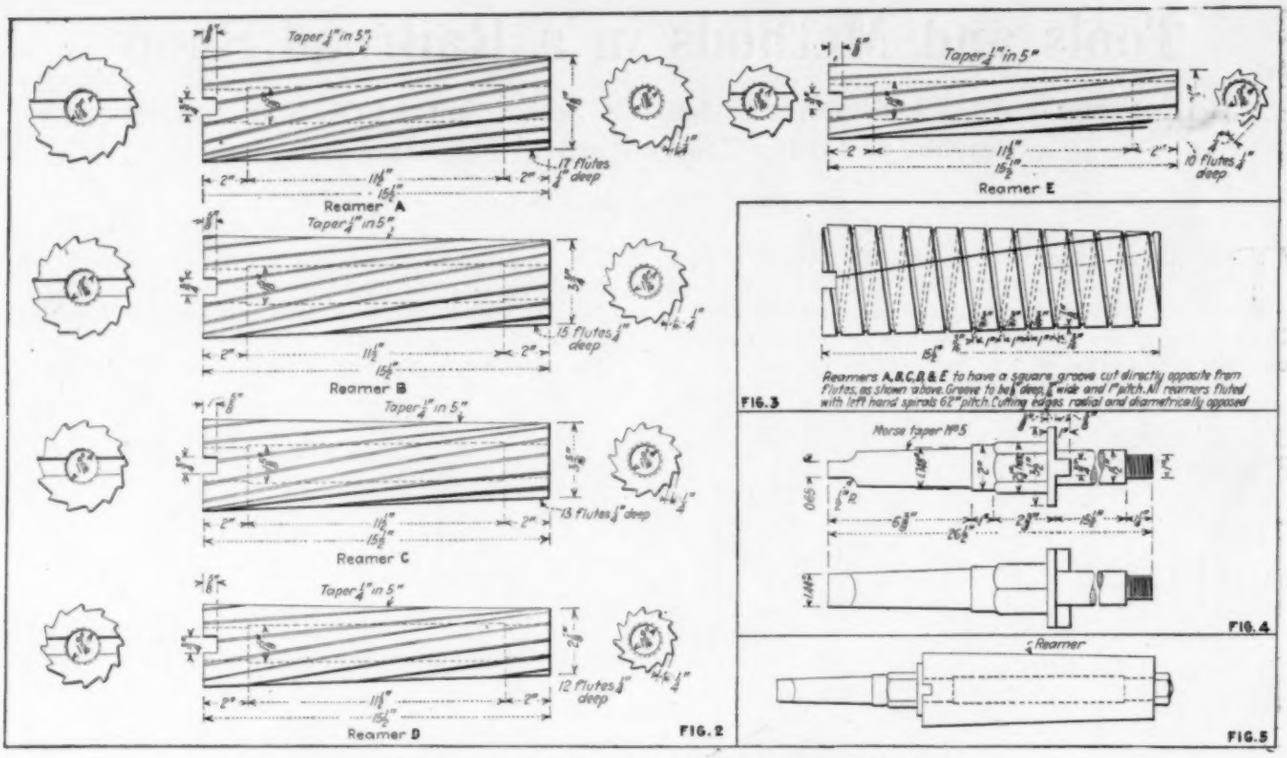
By releasing the clamping nut on the top of the bolt at the center of the block, the tool may be swung half-way around and again secured in position. This makes it possible to run in the narrow grooving tools, then swing the full width tools into position for finishing the grooves to exact width.

The line drawings, Figs. 2 to 5, give full details of a series of spiral-fluted, taper crosshead reamers, the layout covering five sizes. These range from $2\frac{1}{2}$ to $4\frac{1}{4}$ in. in diameter at the small end of the reamers. The number of flutes range from 10 in the smallest size of reamer to 17 in the largest in the series. All sizes are fluted with left-hand spiral cut to a lead of 62 in. in one turn, or as commonly expressed, to a pitch of 62 in. The flutes are cut $\frac{1}{4}$ in. deep and with their faces radial. As shown by Fig. 3, a square groove $\frac{1}{8}$ in. deep by $\frac{7}{16}$ in. wide is milled directly opposite the flutes, to break up the cut. The lead of this right-hand groove is 1 inch.

Reamers and Shanks

The reamers are made independent of the shanks, Fig. 4. The body or cylindrical portion of the shank has a diameter of $1\frac{1}{2}$ in. to receive the hollow reamers. A cross-key is formed on the face of the shoulder on the shank and this key enters a slot milled across the end of the reamer so that when the nut at the end is tightened, the shank and reamer are held securely together. The assembled reamer is shown in Fig. 5.

An interesting form of gage used for testing driver


Taper ¼" in 5"
Reamer A
Reamer B
Reamer C
Reamer D
Reamer E
17 flutes ¼" deep
15 flutes ¼" deep
13 flutes ¼" deep
12 flutes ¼" deep
10 flutes ¼" deep
FIG. 2
Reamers A, B, C, D & E to have a square groove cut directly opposite from flutes, as shown above. Groove to be ⅛" deep, ⅛" wide and 1" pitch. All reamers fluted with left hand spirals 62° pitch. Cutting edges radial and diametrically opposed
FIG. 3
Morse taper No. 5
FIG. 4
Reamer
FIG. 5

FIGS. 2, 3, 4 AND 5. DETAILS OF CROSSHEAD REAMERS

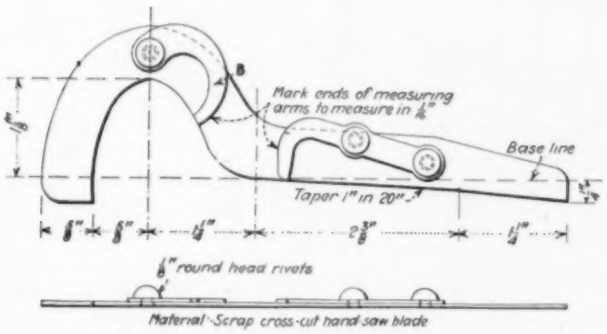

Mark ends of measuring arms to measure in ⅛"
Base line
Taper 1" in 20"
⅛" round head rivets
Material: Scrap cross-cut hand saw blade

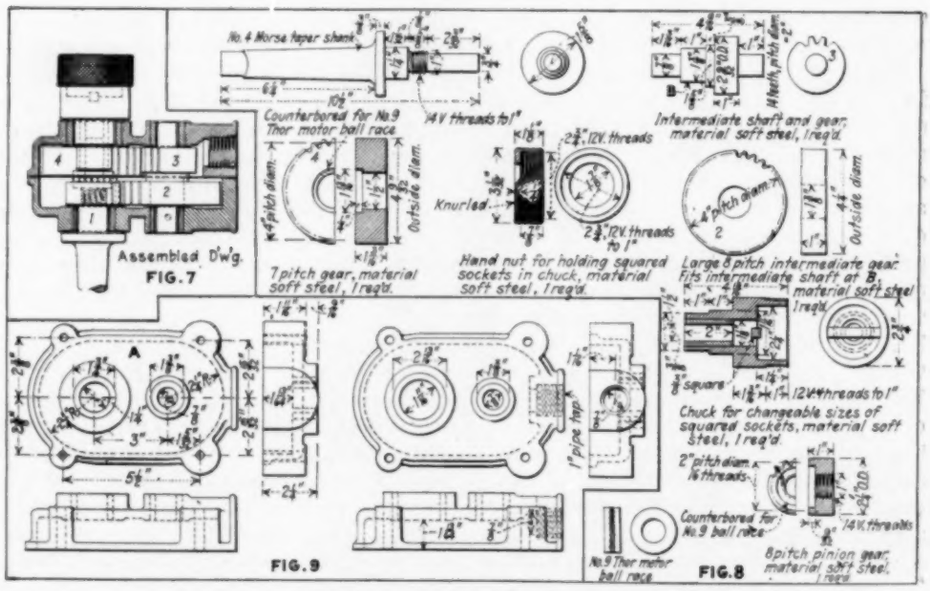
FIG. 6. GAGE FOR TESTING DRIVING AND TRAILING WHEELS

and trailer wheels is illustrated by the line drawing, Fig. 6. The gage is adapted to measure the wear on the tread and on the inside of the flange by means of two swinging points *A* and *B* which come in contact with the surfaces noted. The ends of the hooked-shaped gage points are graduated to read directly in sixteenths, but very much smaller amounts may be read by inspection.

In connection with the use of various classes of large and medium-size tools used in the way of drilling, tapping, seating and other operations, the speed reducer for motors shown in the drawings, Figs. 7 to 9, should be of interest. This device is shown as made at the Southern Pacific shops and all details are given in the drawing. The assembled mechanism is shown by Fig. 7, the various steel details in Fig. 8, and the casing details in Fig. 9. The gearing gives a four-to-one speed reduction. The method of construction will be understood without detailed explanation.

MISCELLANEOUS TOOLS

The drawings, Figs. 10, 11 and 12, illustrate certain boiler-stop tools. Fig. 10 shows scarfing tools for boiler flue-sheet flanges. These tools are made up with six inserted blades of high-speed steel which fit radial slots in the head of the appliance. A machine-steel sleeve fits over the blades or cutters from the rear and


Assembled D'w'g.
FIG. 7
No. 4 Morse taper shank
Counterbored for No. 9 Thor motor ball race
14 V threads to 1"
Intermediate shaft and gear material soft steel, 1 req'd.
2½", 12 V. threads
Knurled
2½", 12 V. threads to 1"
Outside diam.
7 pitch gear, material soft steel, 1 req'd.
Hand nut for holding squared sockets in chuck, material soft steel, 1 req'd.
Large 8 pitch intermediate gear fits intermediate shaft at B, material soft steel 1 req'd.
⅜" square
12 V. threads to 1"
Chuck for changeable sizes of squared sockets, material soft steel, 1 req'd.
2" pitch diam. 16 threads
14 V. threads
Counterbored for No. 9 ball race
8 pitch pinion gear material soft steel, 1 req'd.
1" pipe tap
No. 9 Thor motor ball race
FIG. 9
FIG. 8

FIGS. 7, 8 AND 9. SPEED REDUCER FOR AIR MOTORS

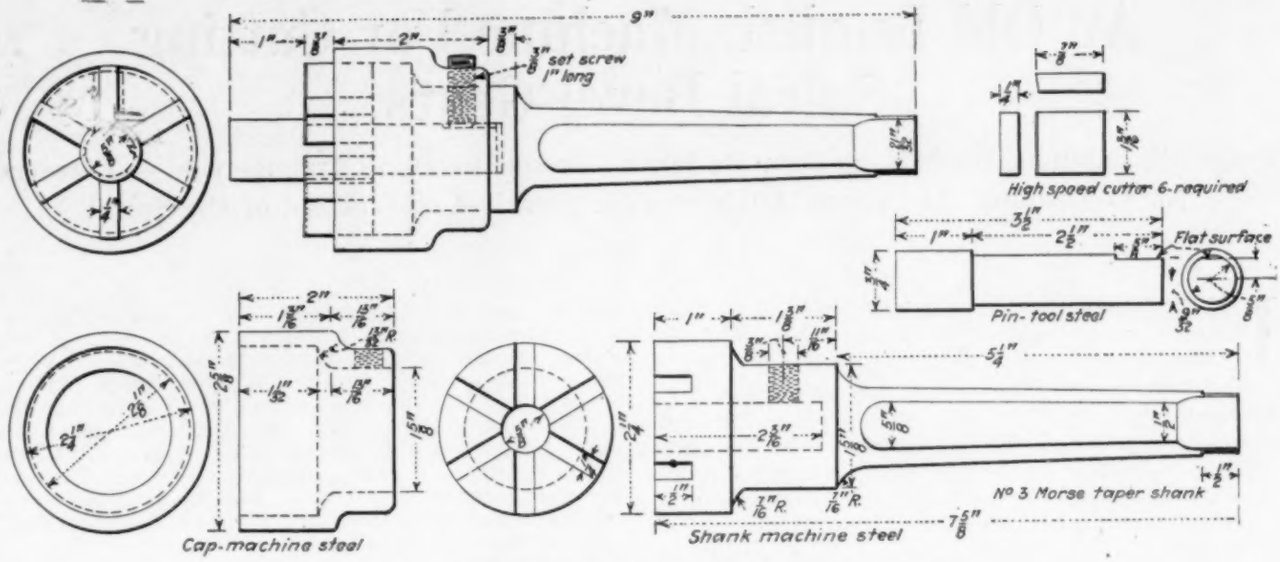


FIG. 10. SCARFING TOOLS FOR FLUE-SHEET FLANGES

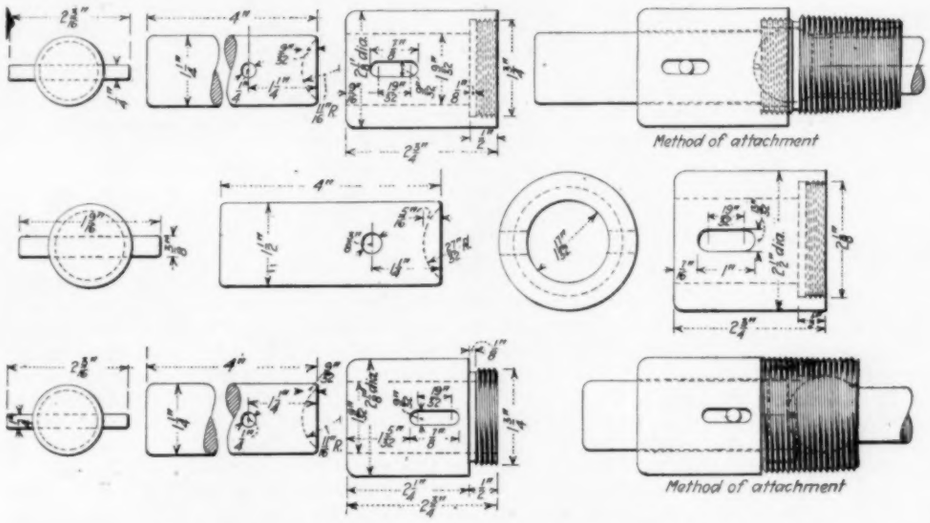


FIG. 11. HOLDING-ON TOOLS FOR RIVETING FLEXIBLE STAYBOLTS

The diagram, Fig. 12, shows the relation of washout plugs to taps and tap graduations. Four taps make up the set, all cut to 12 V-threads per inch. The graduations from the small end of the smallest tap to the large end of No. 4 or the largest tap, are marked from 1 to 12, so that there are three graduations to each tap. The diagram at the bottom of the drawing shows how the taps are proportioned to overlap from one size of plug to another, each tap thus taking care of some portion or all of the three plugs in its range. The tools described in this article are shown as made and used in the shops of the Southern Pacific Company, at Sacramento, Cal.

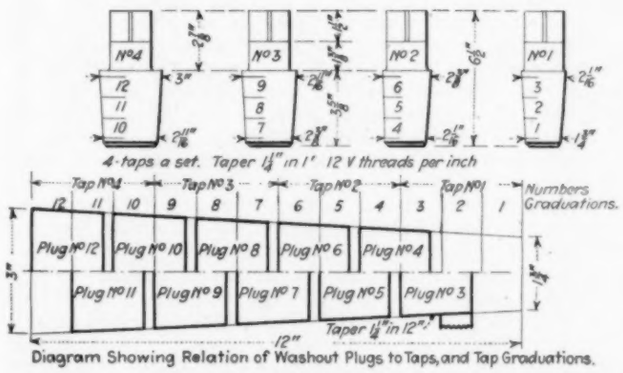


FIG. 12. DIAGRAM SHOWING RELATION OF WASHNUT PLUGS TO TAPS AND TAP GRADUATIONS

this is secured by a hollow-head screw which is tapped through the body and also serves as a holding screw for the pilot pin.

The drawing, Fig. 11, shows holding-on tools for riveting flexible staybolts. Full details are given on the drawing, and the method of application is so clearly shown as to require no explanation.

Air-Cooled Suit Designed to Protect Welders

A brief item in the *Journal of the American Welding Society* refers to a new type of air-cooled suit that has been recently invented and which is designed to protect the oxy-acetylene welder from the heat he is exposed to in doing heavy welding in confined places. The inventor claims that the wokman equipped with this suit is protected from the heat by the circulation of the air around his body. The air passes through the mesh of the fabric of which the suit is made. The air is supplied by a pan through a flexible tube fastened to the suit.

In very hot work the helmet is used to protect the welder's head from the heat and also to supply fresh, cool air for breathing.

The suit is also supposed to be a protection against poisonous gases and can be worn for hours at a time without discomfort.

An Old English Machine For Cutting Spiral Bevel Gears

Originally Intended for Making Gear Patterns—Unique Indexing Arrangement — Formers for Controlling the Cutting Angle and the Spiral—Construction of the Spiral

By W. OWEN

I HAVE in my possession a book entitled "A New Century of Inventions," by James White, civil engineer, published in Manchester, England, in 1822. The book is most interesting, and shows many inventions which are, even today, looked upon as relatively new. Amongst these are the curved tooth bevel gear and the method of cutting the same. In view of the recent developments in this direction, particularly in your country, I enclose a copy of this portion of the book, which, as it is probably the first record of this type of gearing, may be of interest to your readers.

The article sheds a vivid light on the engineering literary style of that period, and in order not to disturb the atmosphere, I have left the wording exactly as it is given.

OF A CUTTING ENGINE

For large Bevil Wheels and Models, on the Patent Principle.

One of the most prominent subjects of this essay, if not the most important, is the System of Toothed Wheels, with which the second and third Parts were introduced, and which still claims a share of my readers' attention. As hinted a few pages backward, it seems not enough for me to exhibit and describe the System, but I must defend it against repeated objections, on pain of seeing it's utility delayed, and the public deprived of it's real and solid advantages. I am *far* from wishing to impeach the *motives* of those who still nourish or express dissent, when they deign to bring reasons for so doing; but the mere opinion—"it won't do"—expressed by a man of reputation, may impede, for a time, the progress of an useful discovery, and thus produce a public evil. This, then, is a result I am anxious to avert; as the present System *has* many points of excellence, against which no insuperable objection *can* be brought. Had I not declined, already, to name either the friends or enemies of the System, I might here appeal to persons who highly approve of it; and, indeed, who use it daily with manifest advantage. But, I forbear. If, by means of the Engines already given, and *that* I am going to offer, it is proved, that the difficulty of making these wheels is *trifling*, compared with their utility, one important point will be gained: I shall not hear it repeated, "that the System cannot succeed, *because of the difficulties of it's execution.*"

The present Cutting Engine is shown in Figs. 1, 2, 3, of Plate 32. It's immediate use is to form the teeth of *wooden models*, for casting. These are previously *built* as usual, and *lagged* with *bay-wood*, of sufficient thickness to furnish the teeth, and leave a small thickness of *that* wood behind or under them.—*A B*, in Fig. 2, represents a wheel of this kind, ready for cutting;—mounted correctly on the center pin *C D*, which latter is so formed as to be *fixable* in any position on the table or bench *E F*. Under the wheel *A B*, there is a kind of *index a b*, put upon the said center pin *C D*, which, by means of the clamp and screw *b c d*, can be occasionally connected with the wheel *A B* so as to turn it, when it is itself turned by the means hereafter to be mentioned. To proceed with the description: *G* is a slide, moving horizontally on the bench *E F*, as seen at *f e* Fig. 3; this slide being the basis of the headstock *G H*, which contains the *perpendicular slide H I*, itself the support of the cutter-frame *K L*, so constructed as to turn on it's bolt above *I*, and take any proper position over the edge of the wheel or model *A B*. This slide, then, with it's appurtenances *H I K L*, moves along the bench *E F*, as seen in Fig. 3 at *f e:* and what gives it this motion, is, the screw *g*, furnished, purposely, with a left-handed thread, working in the *half-nut* contained in the small frame *h*, which contains also a jointed *cap*, that can be lifted off in an instant, and the screw set at liberty. Moreover, the second use of this screw *g*, is to *be* thus disengaged from it's nut, and lifted up to about *i*, where it serves to push back the slide *G* toward the wheel, without that loss of time it would occasion if pushed back by the working of the screw. The letters *M N*, shew another important part of the Machine, applying to the cutting-process. It is an inclined plane, sloped to the same degree as the bottom of the teeth of the wheel. (See the line *a k*.) This inclined plane, then, is fastened, in any proper place, on the bench *E F*, by the wedge *N*, *just* like the puppet of a common turning lathe; and it passes through an opening in the slide *G I*, or rather suffers this to pass *over it*, as better seen at *M*, Fig. 3. Furthermore, the slide *I* (Fig. 2), after gliding down this inclined plane *M G*, will have to be raised between each cutting: and that is the office of the workman's hand acting on the lever *O P*, through the iron frame *Q M*, which is shewn at Fig. 3, in another direction; and marked with the letters *Q l m*. In fine, the slide *G* carries on each side of the Machine a pulling bar *n*, connected with the said slide, and with a smaller sliding piece *o*, the use of which is to hold a pin (seen in the figure, but leaving no room for a letter of indication), which *turns* the wheel *A B*, by the plate *p*, as the slide *G* recedes, and the cutter-system *I K L* descends on the inclined plane before-mentioned. Having thus adverted to all the important parts of the Machine, we turn to Fig. 1, for the purpose of shewing *what* the plate (whose edge is seen at *o p*) means; and the effect it is intended to produce.

In that figure, let *B A c* be the section of any wheel it is desired to cut on this principle. The width of the face of such wheel is shewn by the line *a b;* and *a c* is called the *projection* of that face, on the base of the cone of which the wheel *A B* is a portion; it's summit being at *C*. The line *e d*, shews *one* of the spiral teeth with which the wheel is to be furnished; and I make it by this uniform process: The pitch of the wheel, whatever it be, is set off from *e* to *f:* and that pitch is divided into *eight* parts, (shewn here as *four* on account of their smallness) while the width of the face *f d*, is divided into *nine* parts, shewn here (for the same reason) by *four and a half* divisions. This latter division is more numerous than the former, that the principle may be a little *overdone;* or that the teeth may overlap each other by 1/9 of the pitch: To which purpose, beginning the spiral line *e d* at *e*, I move in the second circular line from *e* to the second radial line *C i*, and draw *that diagonal* which forms the first part of the curved line *e d*. From this second point, I go to the third circular line, taking also the third radial line, and drawing the diagonal. This I do until arrived at the fifth circular line, when I find myself likewise at the fifth radial line *C d f*. These four spaces thus gone over, represent the eight parts into which this part of the face *a b would have been* divided, had the figure been larger: and there remains a small division near *d*, equal to one half the others, through which the curve *e d* is prolonged by a similar process: and this latter portion is what the successive teeth *overlap* each other, as before stated.

Now, it will be seen below, that the needful *circular* motion is given to this wheel, by a movement that takes place in a direction parallel to the base *a c B* of this figure. The curve *e d*, must, therefore, be transferred from the surface

of the cone, to this base *a c* B. To do this, I place a point of the compasses at *A*, and trace, with the openings *A a*, *A c*, &c., the six *quadrants* included in the space *a c g h*, which are now the projections, on the base, of the circular lines *a b f d* on the surface of the said cone. Here, a slight difficulty should be obviated: strictly speaking, this *projection* would be horiontal, and, of course, invisible in this position of the wheel. But I have supposed the figure *a c g h*, turned ninety degrees downward, round the horiontal line *a B*, so as to make one representation suffice; and also to shew the connection of the lines *a b g h*, with those *f d a b*. The curve *k l*, is thus a *copy* of that *e d*, only *shortened* in the proportion of *a b* to *a c*—that is, of the side of the cone *a C*, to the half-base *a A*.

To secure, then, the coincidence of the pitch, as set off on the circumference *a f* and *a g*, we must divide a similar portion of both into an equal number of parts, *e f;* and treat them, on the lines *a c g h*, as we did on those *a b d f;* by which means we shall get the curve *k l, the projection of that e d*. And this curve *k l*, must be made part of a *plate k l m n* (about 1/10 on an inch in thickness), the use of which is as follows:

This Plate *k l m n*, is no other than that marked *o p* in Fig. 2; and it is there fixed to the index *a b*, directed to the central pin *C D*, as it is in Fig. 1 to the center *A*—insomuch, that the *pin* shewn in Fig. 2 near *o*, acting on the *sloping* curve *k l*, will turn that index (and with it the wheel) by the very motion which draws back the slide *G* (Fig. 2), and lets down the slide *I* on it's inclined plane *G M*.

We may remark, lastly, that as the present Machine is adapted to *large* models, it is not, now, provided with a dividing-plate, although the means of so doing are self-evident. On the contrary, the division dots are seen on the edge of the wheel *A B*, as is likewise one dot, near *b*, on the clamp *b c*, from which a given distance is set off to each of the dots on the wheel, so as to give the pitch required. By these means, then, the wheel is divided and cut, in good, if not in exquisite divisions; and all the teeth take their shape from the Plate *o p* (or *k l m n of* Fig. 1), and are thus good, in that respect also.

To recapitulate the steps of this process—The workman stands behind the Machine, near *E;* and, working the screw with his right hand, draws back the slide *G*, (the *power* then turning the cutter *r* very swiftly) by which means, the slide *I* glides down the inclined plane *M*, and the cutter, impinging on the sloping face of the wheel, cuts it to the depth *r a;* the shape of the tooth (by the turning of the wheel) being the spiral form *e d* of Fig. 1. It may be added, that the lifting lever *O* permits this descent of the bar *Q M*, because it is suffered to fall lower than *now* represented. Thus, when the slide *G* is arrived near *h*, the tooth is finished; and the cutter leaves the wheel at *a:* after which, the cutter-frame and slide *I K L* are raised by means of the lever *O*—the screw *g* taken out of its *steps*, and the slide *G* pushed back by it, until the vertical slide *I* rests again on the inclined plane *M*, as it at first did. Nothing, now, remains to prepare for cutting a new tooth, but to change the division-dot, by the application of the gauge or compasses, from *b* to the next point on the wheel; to do which, of course, the clamp *b c* must be loosened and refastened by the thumb-screw *d*. I would just notice the 4th figure—to say, it is a sketch of one quarter of a bevil wheel: intended merely to shew the form and position of these teeth, and the general appearance of the System.

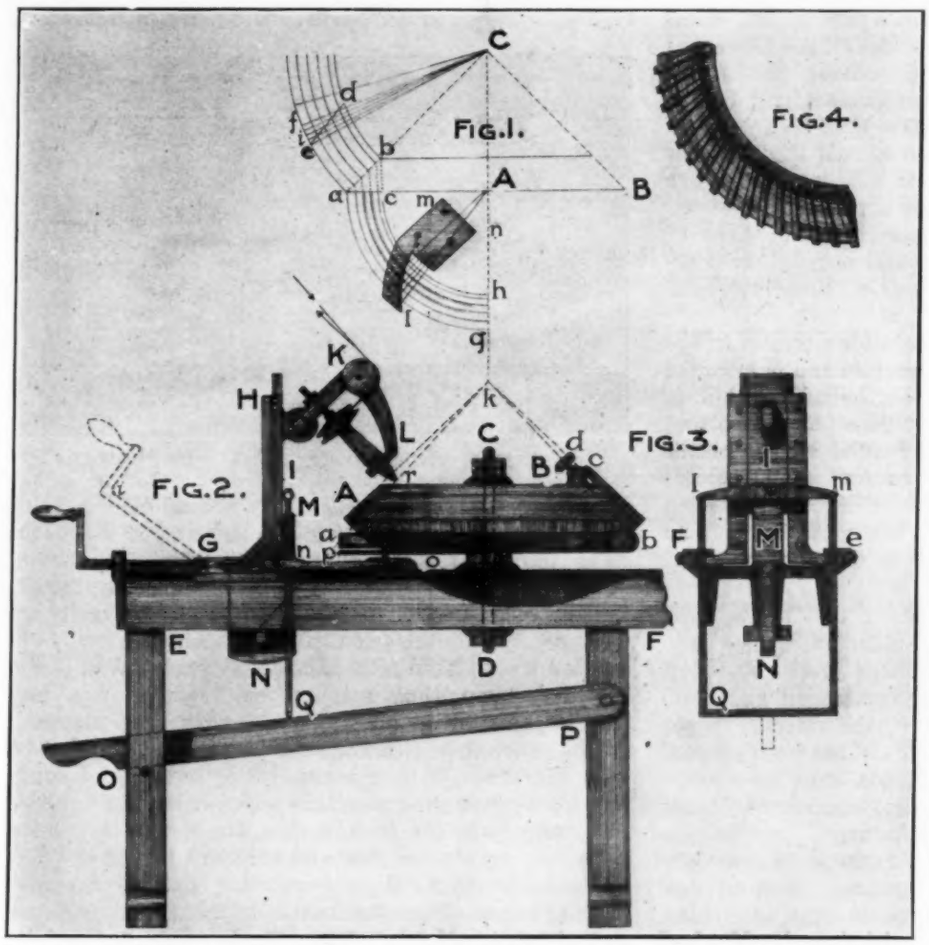


FIG. 1. CONSTRUCTION OF THE SPIRAL. FIGS. 2 AND 3. THE GEAR CUTTING MACHINE. FIG. 4. SKETCH OF PART OF A SPIRAL BEVEL-GEAR

Finally, my readers will please to advert to what has been already said on the *forms* of these teeth, and their uses: and recollect especially what was observed on the epicycloid, as applied to them. It will easily be perceived, that to *put* that form on one of these teeth would be an almost hopeless attempt! —and, happily, it is not necessary. We can, however, by using the cutter *r* with various slopes, and going several times through each *space*, cut *facets* on the teeth, quite near enough to the theoretical form to make them work *well* together; and, as before observed, nothing is wanting to make the teeth *perfect*, but to run them with the wheels placed in due position.

Safety Code for Grinding Stands

The maximum angular exposure of the grinding wheel periphery and sides for hoods used on machines known as bench and floor stands should not exceed 90 deg. or one-fourth of the periphery. This exposure shall begin at a point not more than 65 deg. above the horizontal plane of the wheel spindle.

Whenever the nature of the work requires contact with the wheel below the horizontal plane of the spindle, the exposure shall not exceed 125 deg. This exposure shall begin at a point not more than 65 deg. above and extend to a point not more than 60 deg. below the horizontal plane of the wheel spindle.—(*From A.E.S.C. tentative standard safety code.*)

An Eastern Shop of Modern Design

Concluding the Description of a Machine Tool Shop—Lighting, Heating and Power Applications—Crane Service and Sanitary Arrangements

BY C. E. CLEWELL

THE crane service adopted in the new Gould & Eberhardt plant at Irvington, N. J., consists of two 10-ton Shepard cranes, one in each of the high bays, with one-ton electric hoists in the small bays. In the high bays, a number of jib cranes of special design have been installed in such a way as not to interfere with the overhead crane service, these jib cranes merely serving as a help-out to relieve the larger traveling crane over a small radius immediately around the jib crane. These jib cranes have a 12-ft. arm, have a lift capacity of one ton and can handle the needs of approximately three machine tools. A special feature is the use of a steel angle arm for supporting the horizontal crane arm, which is supported at the base of the crane, thus holding the horizontal arm by compression and not interfering in any way with the overhead crane.

The supporting run-way for the 10-ton cranes in the high bays consists of reinforced concrete and is mounted on concrete brackets as a part of the main columns. On top of these run-ways a heavy pine board is placed as a base for the crane track, this general scheme resulting in quiet operation. Direct current crane motors are used. The supporting run-way of the small one-ton cranes in the low bays is made up of eye-beams mounted on special clamp devices attached to the shop columns.

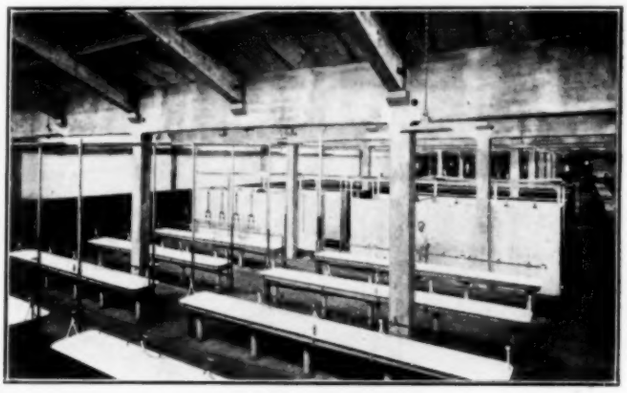
Artificial Lighting in the Shops

The artificial lighting of the plant is divided into two parts, namely, that for the shops proper and that for the offices and the drafting, production and planning departments. For the shops, the mercury vapor lamp of the Cooper-Hewitt Electric Co. has been adopted as standard in preference to the Mazda lamp, for reasons given below. In the offices and drafting rooms, Mazda lamps are used in semi-enclosing fixtures.

These shops contain a splendid example of a modern and carefully planned lighting system. A good deal of attention was given to the type of lamp to employ, the two principal forms considered being the Mazda-C or nitrogen filled lamp with some form of shop reflector, and the mercury vapor lamp. The management felt that it could not afford to use the brilliant Mazda-C lamps in the shops when it was possible to secure the restful effect of the mercury vapor lamp with its relative low brightness and consequent low degree of glare effect. As a result, the entire shops, with the exception of washrooms and stockrooms, are equipped with the mercury vapor units, the Type P lamps for direct current circuits being used in the low bays, and the double-P, or two-tube units being used in the high bays.

One mercury vapor lamp is used per bay, which is closely equivalent to one watt per square foot, a value chosen to insure highly adequate illumination for the work with no need for local lamps. The general distribution of the light from these lamps is such as to produce a low degree of shadow effect and the results of the artificial light approximate those of natural light. No difficulty has been experienced from the spectral character of this type of lamp and no effort is made to correct its greenish color by the use of special reflectors.

The lamps in the central bays are all equipped with regular angle-type porcelain enamel metal reflectors,



WASHROOM SHOWING TROUGHS AND SHOWERS

and those near the side walls have special 45-deg. angle type reflectors for throwing the light away from the walls to the working surfaces adjacent. A row of double-P lamps runs down the high bay aisle and under the crane run-way on each side while smaller units are used for the illumination of the benches below. The lamps are supported from the roof by two flexible chains for each lamp, thus keeping the lamps in one fixed angular position at all times.

For renewal or cleaning, the lamps in the high bays may conveniently be reached from the guarded walkway attached to the crane, this walkway having a railing and being safe for such work. The lamps in the low bays may be reached from an ordinary ladder.

Mazda lamps with semi-enclosing fixtures are used in the various offices and in the drafting and associated departments. Mazda lamps are also employed for the washrooms and stockrooms.

Shop Motor Applications

The application of power to the machine tools used for manufacture in this plant is either by the group motor or by individual motor drive methods. An interesting and important feature connected with the group motor drive is the use of automatic push button control for each group motor. For this purpose, a closed panel box is mounted on a column near the motor, and inside of this box fuses, a mainline switch, a circuit breaker and the contactor switches for starting are mounted. In other words, each group motor has the complete protection afforded by this equipment. On the outside of this panel box an off and on push button is located. The group motors are suspension mounted from overhead steel frame work and belted to a large pulley on the group line shaft.

These shops find considerable use for the adjustable

speed motor and quite a number of the machine tools thus have their own individual motor. For example, the large planers are driven by reversing motor planer equipments, three or four at present being operated by constant speed motors with a temporary frame work for mounting the motor overhead, although these few planers are ultimately to be equipped with reversing motors.

Heating and Ventilation

Heating is accomplished by a system of radiators mounted overhead to act as an insulator for the saw-tooth sash and to expedite the passage of the heat to the floor. Other floor radiators are used at certain locations. The heating is done by exhaust steam and makes use of the differential valve vacuum system with a vacuum pump ranging from 3 to 5 lb. pressure.

Ventilation is provided by hand operation of the sash in the saw-tooth roof, all sash in the high bays being arranged for hinged opening, and 80 of the 160 ft. of sash across the low bays being similarly arranged.

Steel shelving has been adopted for all toolroom bins and also for holding raw materials in the storage spaces. The bar stock, for example, is held in steel shelf compartments, the heavier parts being stored above for the convenience of handling by the overhead cranes, and the lighter parts below are taken care of by hand. The bins for ordinary raw material are open while those for bronze parts are equipped with doors and locks.

Portable Elevators

A valuable aid for quick repairs and also for handling parts at some height above the floor is the use of portable revolving elevators of the Revolving Portable Elevator Co., which avoid the necessity of ladders in many cases and which are of considerable help for puting up countershafting, for oiling and for the maintenance of the overhead group motors and for belt repairs.

Automatic scales are adopted as standard for the receiving and shipping ends of the plant and it may be stated that the railroad track at the receiving end of the shops is at floor level rather than being depressed, as it has been felt that the use of depressed tracks inside the shops introduces an unwarranted disadvantage in the irregularity thus imposed on the floor space. Where it is desirable to unload material with the floor of the car at the shop floor level, a track just outside and along the outer wall of the shop is depressed so as to make this possible.

Where jigs are not available and it becomes necessary to lay out the work in the usual way, a large laying out table is provided near the center of the outer high bay aisle. A small air compressor furnishes the supply for air hammers throughout the shops, the lay-out of the air compressor piping being so designed as to give the necessary flexibility to the outlet locations.

The employees' locker room contains 700 lockers, 12 x 15 x 72 in., provided with locks and keys rather than combination locks. Immediately adjoining the locker room a washroom is located. The management decided that enameled troughs were preferable to individual wash basins, these being in sets 18 ft. in length with faucets high enough to permit of washing under running water. They are shown in Fig. 7.

Washing water is furnished initially from the company's artesian well through a tank, with which a steam coil is used for tempering the water to 110 deg. at all times by thermometer control. Eight shower baths are available for the shop men, with hot and cold water.

The main shop entrance opens directly through a hallway into the washrooms and then into the locker room, from which the shop proper is reached. This sequence is considered most advantageous from the standpoint of convenience and the time involved in reaching these two rooms.

The shops contain one toilet only, centrally located, thus keeping all plumbing at one place. This toilet has a slightly depressed floor and can be completely flushed with water. Unusual care has been given to the plumbing and fittings in this toilet and to complete ventilation. Access to the closet plumbing is furnished by side doors and a passage which extends the full length of the room.

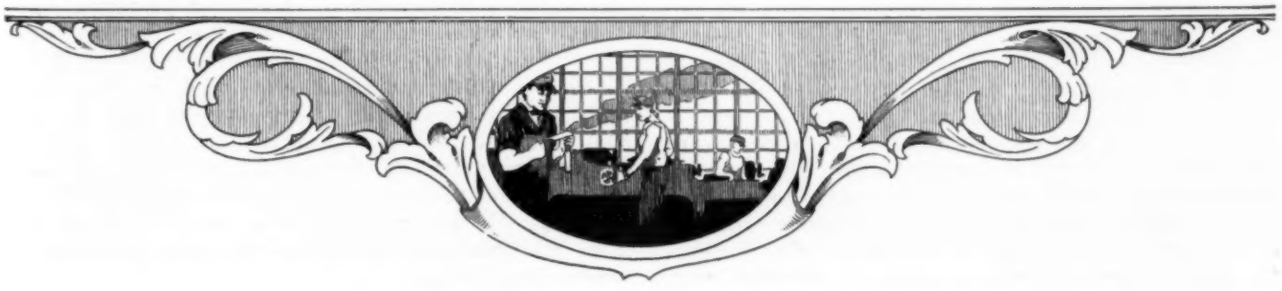
Separate toilets and washrooms are located adjacent to the offices and near the drafting rooms. An ingenious wardrobe supporting holder is found in the clothes closet of the offices, which is constructed from simple pipe and pipe fittings with a wire screen above for hats.

Drinking fountains are placed throughout the shops, furnished with water from the local well, and each one provided with a sump below the fountain pipe standard for drainage. Provision is made at each drinking fountain for a hose connection for washing the floor. Among other sanitary provisions there may be mentioned the complete exhaust system for the removal of dust and dirt in connection with the polishing machines.

Hospital Facilities

Near the main shop entrance a liberal space is enclosed for hospital purposes. This room is completely covered with white enamel including the roof trusses. It is fully equipped.

The completeness of the sanitary arrangements is merely one indication out of many which might be mentioned, to show the thorough manner in which these new shops have been planned. This particular company in moving from old quarters with years of experience under more or less limited manufacturing conditions, was in a position to give deliberate attention to many refinements in the equipment and in the general lay-out of departments, which makes these shops, as a whole, highly satisfactory for the purposes for which they were designed.



Refinishing the Bores of Internal Combustion Motors

By S. M. Ransome

As has been pointed out in recent issues of the American Machinist, an increasingly extensive line of mechanical work is opening up in refinishing the cylinder bores of the 9,000,000-odd gasoline motors now in use in this country.

A worn cylinder bore presents to the unobservant or unmechanical eye the appearance of a well polished and apparently round and true hole; but a little measuring soon discloses the fact that the bore, though smooth, is no longer round or parallel, but is enlarged toward the upper end and is somewhat oval in places. There may also be a worn spot caused by the "kick" of the piston at the extreme ends of the bore.

The next consideration is the thickness and stiffness of the metal to be machined. Here again appearances are deceptive, as to the casual observer the walls present an almost solid appearance, whereas we know that what we really have is a cast-iron pipe of uncertain thickness, usually ranging between $\frac{1}{4}$ and $\frac{1}{2}$ in., unsupported in the center but stiffened at both ends by the top and bottom walls of the water-jacket.

The problem then is to re-finish a long slender cast-iron pipe, of relatively large diameter as compared with the wall thickness in which we are likely to encounter a highly glazed surface with sometimes a few scores and hard spots to further complicate matters.

Early Methods

Until recently there had been but two principal ways of doing this work. If done by the garage man the bore was usually lapped out with an old or new piston, plenty of emery, oil and elbow grease, the resultant hole being sometimes fairly true but more often not, depending on the skill, muscle and patience of the "lapper." Also, no inconsiderable portion of the lapping compound was likely to be left in the pores of the iron walls, or even in the crankcase, with the result that the lapping continued long after the garage man had reassembled the motor.

The other method was to strap the block on the carriage of an engine lathe and rebore the holes with a single point cutter held in the regular form of boring bar, usually taking out about $\frac{1}{32}$ in. so that the cutter would not ride over the polished surface of the hole. New pistons and rings would then be fitted up in the engine lathe and the job thus be completed.

In regard to this boring method the writer has found that even when using a double-ended cutter in an expanding boring bar, considerable springing away of the cylinder walls results, so that after taking one cut of, say about 0.020 or 0.010 in. per side, another cut could be taken without altering the setting.

These older methods have been rendered practically obsolete by the new modern methods employed; mainly grinding and reaming.

Many varieties of reaming tools are in use. There is the well-known "Critchley" type of reamer, expanding by means of a conical nut at each end of the blade. This type of reamer necessitates a pilot or support to make sure that the tool enters the hole properly and consequently we find various piloting devices incorporated, or else we see the reamer held in the spindle of a drill press or boring mill. A more modern specimen of this type of reamer has a pilot ground directly on to the blades. Then there are a number of so-called reboring tools, comprising a short multi-bladed cutter holder, having a pilot ahead of it usually made in some form of expanding ring and supported behind by a spindle or screw, held in a bracket which bolts to the top of the cylinder block. These tools can be operated by hand, by self-contained electric motor or by connecting to a drill press or boring mill.

Such tools have the advantages of being small, portable and cheap and although probably not as rapid or accurate as a more elaborate machine they have a decided advantage in that they can in many instances perform the work on the cylinder block in place in the car, the cylinder head, pistons and connecting rods being removed, but crankshaft, clutch, etc., being undisturbed.

Still another type of tool which has entered the field later than any of the previous tools mentioned is the expanding reamer which depends on its own blades for piloting. These reamers are usually entered into the hole, expanded to size by some device on top of the reamer and then turned by means of a solid or a ratchet wrench like any other reamer. On reaching the bottom of the hole the blades can be withdrawn and the reamer taken out.

One reamer of this type is suspended by a rope from above, giving the reamer preliminary alignment; this rope passing over pulleys to a counterweight so that the reamer can be left suspended at any point desired. These reamers can be driven as in the case of the reboring tools mentioned either by hand or power and can also be used in the bores in place in the car.

We would say that we have found a properly reamed cylinder bore to be of quite sufficient smoothness for the purpose, as an indicator with spherical point can be run up and down the bore without showing any ridges or hollows of more than 0.00025 to 0.0005 in. variation, and even these minute irregularities disappear after the motor has been run a few hundred miles.

Fit Pistons Closely

In our practice we aim to keep piston clearances within very close limits; thus, if the necessary clearance has been set for any given bore at say 0.003 in., we ream the bore to 0.002 in. clearance and in a very short while the friction of the rings will have taken one-half to one-thousandth from the bore leaving it smooth.

Some fit the pistons even closer than this, leaving hardly any initial clearance but giving the motor a preliminary running-in with plenty of oil and with a stream of cold water flowing through the radiator. This method should result in an almost perfect mating of surfaces and when worn to a fit, the requisite working clearance should have been obtained.

To give one specific example, the writer has seen a block reamed and pistons fitted with about 0.001 in. total clearance. After running about 300 miles the head was removed and examination revealed that the clearance had increased but 0.0005 in., while the working sufaces, though not as yet perfectly mated, were rapidly approaching that state and that probably in the next 300 miles would "reach bottom."

As to the different methods and their relative values, it is as with almost everything else: all good methods and tools have their proper application, there are merits and demerits to all mechanical devices, each finds a field where its good points count and its weak points are not injurious. The working of economic law usually puts men and machines, not forgetting tools, just about where they belong.

Industrial Schools in Springfield, Mass.

SPECIAL CORRESPONDENCE

The new building of the Springfield (Mass.) Vocational School, which opened for public inspection soon after New Year's, is gradually installing machinery and equipment to bring its operations to full scope, and will be one of the best-appointed institutions of its kind in the East. The illustration affords a view of the machine shop. Students of the machine shop and woodworking department are engaged in producing needed equipment for the school, and similar service is rendered by the drafting and patternmaking departments, thus enabling the school forces to be employed without competing to any great extent with wage-earners in a slack season for the machinery trades.

STUDENTS AT WORK IN THE MACHINE SHOP

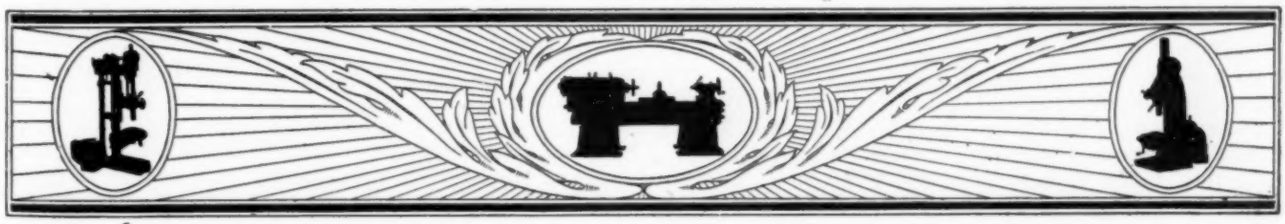
Courses have been instituted in machine work, drafting, patternmaking, cabinet making, printing and electrical work, and a course in automotive mechanics will be started soon. Each course requires three years for the average student to complete. Three-fifths of the time is devoted to shop work, one-fifth to subject matter related to that work, and the rest to general academic subjects with an emphasis on the industrial side. Every student must be over fourteen years of age and have finished work of the sixth grade. The enrollment now numbers 230. In addition there are sixty rehabilitation students placed at the school by the Federal Veterans' Bureau.

The work also includes an evening vocational school, with eighty enrolled, mostly adults, this being extension work within the scope of the Smith-Hughes Act. Every evening student is required to pursue some line kindred to his regular work and every instructor in trade subjects must have had eight years' journeyman experience.

G. A. Burridge, principal, and seventeen instructors constitute the regular staff. Department heads are: E. J. Fasser, machinery; James D. Long, drafting; Thomas L. Flynn, patternmaking; H. T. Perry, cabinetmaking; John J. Mack, printing; Clayton E. Bliss, electrical work.

Also giving instruction in the trades in Springfield are the Evening School of Trades, at the Technical High School Building, with 500 men and 300 women students, directed by a staff of forty; and the Continuation School, having its own building, with 200 boys and the same number of girls. The Evening School of Trades has recently instituted a three-year course in engineering, with six hours of intensive work each week, in addition to courses in sheet-metal work, woodworking, electricity, automobile repair, plumbing, etc. Industries of that section supply many of the instructors. In the women's classes household arts and science are taught. The Continuation School, with students from fourteen to sixteen years of age, all employed in local establishments, conducts courses in machine shop practice, woodworking, printing, commercial subjects and home economics. This school has a particularly well-equipped machine shop, and original work is sought as one of the important ends in the different departments. The school, now in its first year, and having C. W. Robinson as its director, is working out a comprehensive system of production charts and is also making a detailed survey that is to include every industry in the city.

These special schools, as adjuncts to the regular grammar and high schools, which also bear extensively on the vocational and technical side, are engaged constructively in the effort to further the work of training skilled industrial workers that shall keep New England in a high place in the machinery and other trades, and because the industries of the Springfield district are so widely diversified the schools possess exceptional opportunities.



How to Compile Catalogs

Objects of Catalogs—Importance of Engineering Data in Selling and After Sale—Shortcomings of Most Catalogs—Constructive Suggestions for Improvements

By ALEX DOWEL

THE purpose of a catalog dealing with mechanical equipment such as machine tools, small tools and the like is twofold. First, to assist in advertising and selling by showing the nature of the product and giving a description. Second, to give sufficient data and prices so that machines or tools can be selected and ordered from the catalog and a check for the proper amount sent.

Attempts have been made by various manufacturers of machine tools to prepare catalogs that will answer both purposes and while such efforts are commendable as showing a realization of catalog shortcomings and while they are undoubted improvements over their predecessors, they leave a considerable amount of room for improvement.

It Is Necessary to Furnish Information

Does it not appear to be a good business principle to consider the whole subject from a broader point of view and try to find out what people who actually use catalogs think about it? After the catalogs are distributed the manufacturer will doubtless say, "Oh, these are our customers, past, present and future; we want to impress them with the value of our product; that is the purpose of the catalog." Would it not be more nearly correct to say that the prospective customer wants first of all INFORMATION? Really, that is the sum and substance of his needs. The manufacturers will say, "We don't want to tell him too much, for if we do he will not ask for more information; if he doesn't ask for more we cannot get closely in touch with him and the first thing we know the Blank Manufacturing Company will send a salesman to him and sell a machine."

If you depend upon your catalog to act as a salesman you will be disappointed no matter how it is prepared. The salesman also is only an item in marketing your product. The eventual reason why you will make the sales is because of the merits of your product. Your catalog helps, your salesman helps, but your reputation and the merit of your product should be of greater help than anything else.

Let us see what factors are most essential in selling a given mechanical product. There are the cost; durability; operation; cost of maintenance, etc. The man to whom you are selling your machine or tool is usually a mechanical man. But if he is not, he is depending upon some one to advise him. By what method does he reach his decision? Probably by the consideration of cost and relative merit. The cost can be readily determined. If the merits of the machines are backed up by a firm name well-known and of good repute, the selection may be made because of that reputation. If the machine is of a new type and made by a comparatively unknown firm, the prospective purchaser must depend largely upon description, specifications and data in the catalog together with any other information which he may receive from the salesman.

Having analyzed to some extent those matters which effect the purchase of the product let us take up a few specific instances of important items which should be included in the catalog: (1) General description, stating the purpose of the machine and the class of work to which it is most suited; (2) details of construction; (3) details of operation; (4) applications to various kinds of work; (5) specifications; (6) selling price.

In the general description considerable latitude is permissible. If the factory has been established a great number of years and is well known it may be of interest to say a few words regarding the organization, its inception and progress over a period of years. Some manufacturers take up these matters at considerable length but I do not believe that it is essential. Following a brief history, the principle uses of the product should be stated; this will make a logical introduction and lead up to matters connected with design and construction.

A general statement can be made as to important points in design and information can be given as to reasons for certain features. Factors, which in the belief of the manufacturer make it superior to other machines of a similar nature, can be explained. These points should be mentioned in a broad way but should not be taken up in great detail. Paragraphs may be included regarding the various types manufactured and the equipment that can be provided. All of these data may be considered in the nature of an introduction and it should therefore not take up much space, normally 500 to 600 words.

Details of Construction

A consistent method requires that descriptions be given, with line cuts or halftone reproductions of important details in design. The opening paragraph should state the range of the machine so that there will be no doubt in regard to its capacity and ability to handle a given class of work. The head and bed, the spindle, the feeds, the gear box, carriage, oiling system and cutting lubricant system should be mentioned briefly, yet with sufficient detail to make all points of interest clear. The customer will naturaly be interested in any points that have to do with upkeep and wearing qualities. Rigidity, accuracy and power should be referred to. The wording should be convincing yet conservative.

Another matter which will always interest any one who is in the market for a machine is the method of handling and convenience of operation. The shop man for instance would wish to know how the various speeds and feeds are obtained and would doubtless decide as to whether or not the levers and handles were conveniently placed. The feed mechanism, the gear box, the various levers, can be briefly described. Great detail would not be required as the operator's hand book would give all necessary information regarding setting up.

It is always of interest to show applications of machine tools to various kinds of work for which they are particularly adapted. Often a customer will be influenced to buy machines and tools if he is shown the application to work of various kinds. Considerable

variety in the examples given will not only illustrate specific cases but will make the flexibility of the machine apparent. On certain types of machine tools that require considerable tool equipment, such as turret lathes and the like, the data presented will be of particular interest to the shop man and the engineering department. Therefore, if the examples given are selected with a view to showing the adaptability of the machine to a wide range of conditions there is much more likelihood of a sale. If the examples shown are drawn in detail with dimensions and production figures, an impression of the greatest value is made on the prospective customer as it places before him several concrete examples of machining operations together with the length of time necessary to do the work. A comparison of the production time with the time on similar work being machined in his own factory may affect the situation strongly enough to create a desire to possess one or more of the machines. Several manufacturers of machine tools have shown detail drawings of various parts giving production time on each but they have not in the majority of cases shown the methods of tooling which are applied to each case. The writer believes that it is important to show how the results were obtained. The amount of space available for these details depends upon the size of the catalog, but it is usually possible to devote three or four pages of a catalog of normal size to them.

Specifications

Machine tools are built in various sizes and with different capacities. A table can be arranged to include complete specifications regarding sizes, capacities, speeds, feeds and all other data necessary when planning production work. The present lack of information is regrettable. There is hardly a catalog that will give all the information necessary to enable a tool engineer to design fixtures or special tools for the machine described. If the preparation of the specification table should be turned over to the engineering department with a request that it confer with the tool department to make sure that all important dimensions are included, a long stride in the right direction would have been taken.

It should not be necessary for the tool designer to go out into the shop and measure up a machine, yet in the majority of cases such a procedure is required.

In addition to the actual specifications, it may be necessary when special tools are to be fitted to various parts of the machine to include a certain amount of special engineering information in diagram form with dimensions. The spindle for example should be shown in section with all necessary dimensions so that a chuck or faceplate can be properly proportioned. So also the turret and cross-slide on a turret lathe should be given in detail. On milling machines the table dimensions and distances between T-slots as well as the dimensions of the slots themselves should be specified. When standard tools, such as turning or boring tools, are furnished as a part of the equipment, their capacities should be stated in the table. One of the best ways of realizing the amount of data required in a catalog is to put yourself in the place of the man who would be required to design tools for use on the machines described.

When preparing catalogs of small tools there are several points of importance. Some have been mentioned previously but there are a few that have not been taken up. Considering a small tool catalog as a whole, if the manufacturer has specialized along a certain line for a number of years, it would be wise to include as an introduction a brief historical chapter. If several kinds of small tools are made it would seem advisable to include a statement to that effect. General instructions can also be given in the introductory chapters regarding the ordering of tools as can any other data that seem pertinent. The classification of small tools is an important factor for the preparation of a catalog and it is a good idea to group the tools according to some well-defined system. If the catalog is a large one the sections can be divided by sheets of paper of a different color or they can be thumb-indexed. A complete index of all tools listed should be conveniently placed, preferably at the back of the catalog.

A great many small tools are held in bushings or by means of holders. For example a straight shank chucking reamer of small diameter is frequently held in a bushing by means of a setscrew or placed in a floating reamer holder. Whichever method is used it is necessary to know the diameter of the shank. This dimension is usually lacking in small tool catalogs so that when making up holders the reamer shank must be measured. If the reamer should happen to be in stock that might not cause difficulty, but if ordered from outside, as frequently happens, the equipment could not be completed until after the reamer had been received. The same thing applies to straight shank taps and arbors for shell reamers. In fact, it is almost invariably the case that the dimension required for fitting a tool to a holder or bushing is left out of the catalog when it could just as well be included.

There does not seem to be any consistency in the manufacturers' attitudes in respect to giving dimensions. A combination drill and countersink for example is usually held in a drill chuck and the diameter of the body is not particularly important, yet it is given.

General Information

There are frequent cases where small tools are listed and the description that goes with them is not complete enough to give a prospective purchaser sufficient information as to their use. The application of the tool to the work can often be shown by means of a line drawing or a sectional view, thus making the subject matter clearer and enabling the purchaser to analyze his own problem and decide whether a given tool is suited to it or not. I would hardly go so far as to suggest that all tools listed in a small tool catalog should be shown by line drawings but at the same time I venture to state such a procedure would meet with the approval of the entire engineering fraternity. It would be interesting to prepare a catalog of this sort and send it out with a questionnaire for comments as to its utility from both an engineering and sales point of view. It is possible that there may be a happy medium between a catalog containing all half-tones and one containing all line drawings with necessary dimensions.

Speaking broadly I believe that catalogs of mechanical equipment are decidedly in need of improvement. Many things are done year after year that simply follow a precedent established perhaps thirty or forty years ago. The illustrations used are more or less up to date and the art work may be exceptionally good. However, the man who is using a catalog to obtain information prefers finding it to looking at the art work. Appearance should not by any means be neglected though; it would seem that a judicious combination of art and needed information would result in improvement that would be much appreciated by the mechanical fraternity.

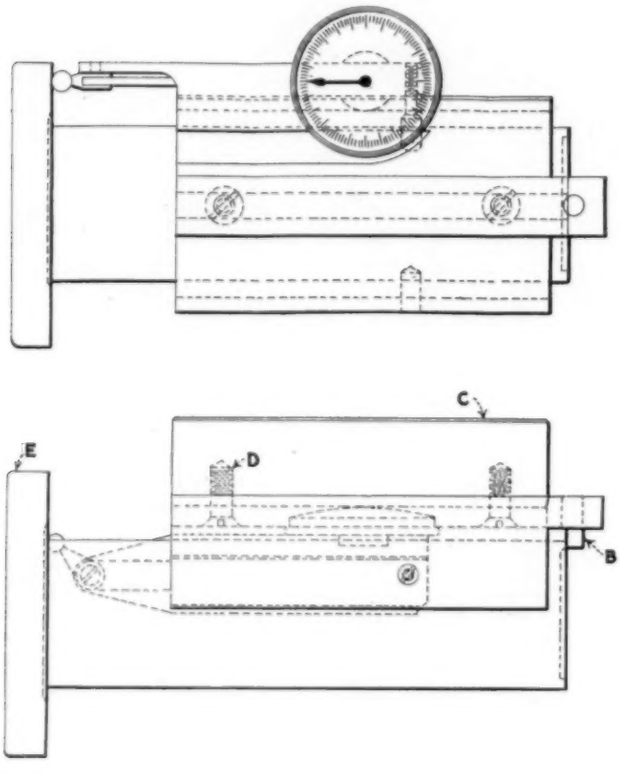
Ideas From Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

An Indicating Length Gage

BY OSBERT E. CHARLES

The accompanying sketch shows one of three indicating length gages that I made, and which have worked out very well for use in grinding shoulders of various shafts to a limit of 0.0005 in. The dial indicator used is a "Last Word" which is mounted on a hardened and ground V-block *A*. In the back end of block there is a hardened pin *B*, the front of which has a flat about $\frac{1}{8}$ in. wide ground on it after the pin is in position, and which comes in contact with the shoulder of the work. The dial indicator is positioned on block *A*, so that the registering point will have a movement of about 0.015 in. on the dial. A piece of cold-drawn steel *C*, $\frac{3}{8}$ x $\frac{1}{2}$ in. with finger grooves milled on each side is fastened to the top of block *A* with two flat-head screws *D*, making a convenient handle for the gage. In order to check the accuracy of the gage a set block or dummy *E* was made to the correct length, and the length marked on it to prevent any chance of error. After the indicator has been properly adjusted, a drop of solder should be put on the pivot of the adjustable contact point to guard against a possible slipping of the friction adjustment.



INDICATING LENGTH GAGE

By using this gage it is possible to gage the work without removing it from the centers and, working it in conjunction with a micrometer stop on the table of the grinding machine, we have been enabled to make considerable saving of time as the operator knows just how much he has to take off and sets his stop accordingly. It is very seldom that he takes more than two readings, one when he starts and one to check himself before removing the work from the centers to put in a new piece.

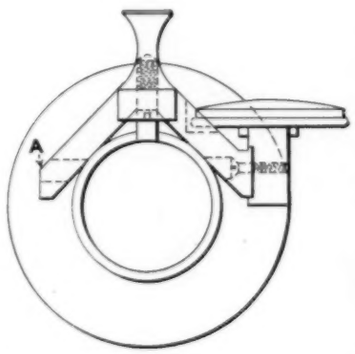
Attaching a Wire Rope to a Socket

BY MARTIN MCLAUTHLIN

On page 309 of AMERICAN MACHINIST, is an article headed "Attaching a Wire Rope to a Socket," in which the opening statement carries the implication that if the cable is attached to the socket in the manner described the connection may be depended upon to develop the full strength of the cable.

In my experience of over thirty years in the use of wire rope fastenings for passenger and heavy freight elevator service, I have become familiar with and have made many tests of various types of cable fastenings and I have found that the fastening described does not merit the confidence it sometimes receives, even when made by men accustomed to it, and it is less reliable when made by amateurs.

Muriatic acid is not a desirable associate for wire cable; often the wires are not properly cleansed of the acid and sometimes the cable is so dipped as to permit acid to be absorbed by the hemp core, in which case "rotting" of the cable speedily follows. Sometimes lead or low-grade babbitt is used instead of zinc and it is not unusual for this fastening to fail by the pulling out of a considerable proportion of the wires under a stress much below the ultimate strength of the cable. In the preparation of the A. S. M. E. "Safety Code for Elevators" very much consideration was given to the matter of suitable cable fastenings and the type of fastening described in your article is not recognized by that code.



I have thus far found but one fastening which insures "that the full strength of the cable may be depended upon," namely, the spliced eye; and that is so logical, simple and reliable that it seems unusual that it is not in universal use. If the simple instructions given in the A. S. M. E. Elevator Code are followed, it is more difficult to produce a spliced eye that will develop less than 100 per cent of the cable strength, than it is with equal care to produce with a "fan hitch," as

your article describes, a near approach to the cable strength; and the "fan hitch" will, if not thoroughly cleansed of acid, deteriorate rapidly with age.

Following are the A. S. M. E. Elevator Code instructions for making a spliced eye:

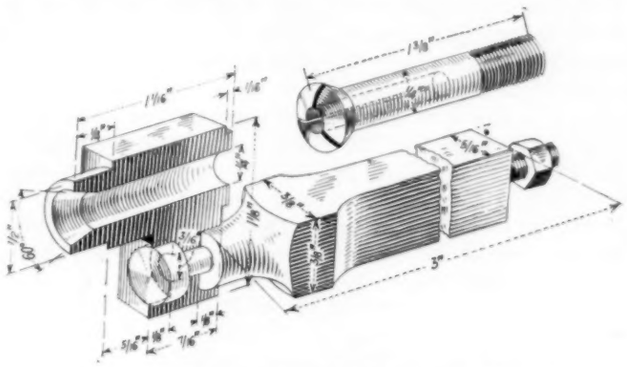
"A metal thimble shall be placed within the eye and the splice made with not less than the following number of tucks: First strand, two tucks; second strand, three tucks; third strand, four tucks; remainder of strands, five tucks. The eye shall be drawn tightly around the thimble, the strands drawn tightly after each tuck and the tuck smoothly laid. After the last tuck is made each strand shall be cut off not closer than one-fourth (¼) inch from the tuck and beaten down flush. The splice may be left bare or served with marline."

Boring-Tool Holder for the Bench Lathe

BY FRANK H. BAKER

The accompanying sketch shows a boring-tool holder that I have found very convenient for use in the bench lathe.

In the shop where I am employed as toolmaker the product is dental tools, and my work consists principally



BORING-TOOL HOLDER FOR BENCH LATHE

in making small dies, jigs and fixtures. I find this holder to be invaluable for holding tools for boring small holes down to ⅛ in. in diameter.

The parts may all be made of machinery steel and pack hardened, except the spring collet. The swinging feature renders the tool quickly adjustable for height.

Pin Wrenches for Any Size Nut

BY I. B. RICH

Nuts and screw connections which require a pin wrench are rather hard on repair men, as the holes are never alike in any two cases and none of us have a large variety of pin wrenches lying around loose. It usually happens that in the nut which you must take off or put on, the diameter of the holes and their distance between centers differ from the pins on any wrench you have.

I had such a case the other day and, as usual, the man was in a hurry. He'd just had one flivver stolen and he bought a new locking wheel to have put on his new car before someone took that one away from him. This wheel had a nut which needed a pin wrench different from any I had. I was just starting to make a wrench in the usual way when a bright idea dawned upon me.

The bright idea was to bend up a staple as shown at *A*, Fig. 1, using the right size wire to suit the holes in the nut. Then I clamped the staple in the hand vise shown

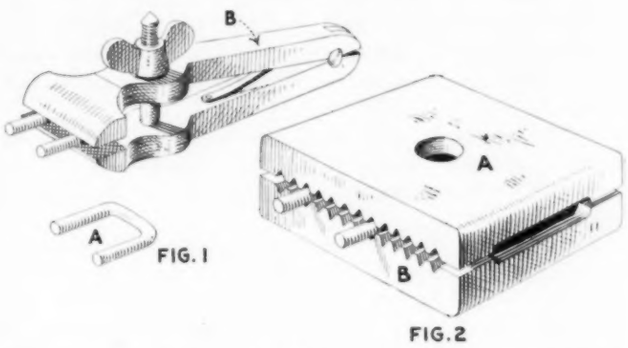


FIG. 1. AN IMPROVISED PIN WRENCH. FIG. 2. A WRENCH FOR VARIOUS SIZES

at *B* and I had a wrench which did the trick by using a wrench on the vise for the final pull. It's an easy matter to bend up a few staples and have them handy for other jobs.

When I get time I'm going to make a real, universal pin wrench as shown in Fig. 2. I'll have two plates like *A* with raised edges *B*. One edge in each plate will have V-notches, spaced as closely as convenient. Then I shall make up several sizes of pins, in sets of two from drill rods, and magnetize the pins so they will stick whenever I lay them in the holder. This will prevent the pins falling out and rolling under the bench while I am setting them for different center distances. With this combination in my tool kit, any old size of pin-wrench nut will be easy picking and there will be no delays to customers.

Enlarging Pistons by Plating Them —Discussion

BY H. CLINTON

Regarding enlarging pistons by plating, as told in an article on page 287 of AMERICAN MACHINIST, I would say that about eighteen years ago I was in charge of some Lanston monotype keyboards and when overhauling a lot of these which had seen considerable service, we discovered that the fits of the pistons which actuated the perforating punches had become so loose that there was quite a loss of power, as well as considerable waste of compressed air through leakage around the pistons.

Careful inspection disclosed the fact that the holes in which the pistons fitted were both bell-mouthed and out of round. As it meant a delay of about three weeks and the expense of purchasing new parts if we relied on the factory to help us out, I decided to re-ream the holes with an expansion reamer until they were round and straight, and nickel-plate the pistons. As the pistons were of brass, copper plating was omitted. The plating was done very slowly on the theory that we would get a fine-grained and dense deposit.

In order to get a variation in size some were left in the bath longer than others, thus enabling us to make selected fits. This procedure worked out surprisingly well. We were able to get the machines in excellent running order in a short time and had no further trouble with them so far as the pistons were concerned.

Special Screw for Securing Strippers to Dies

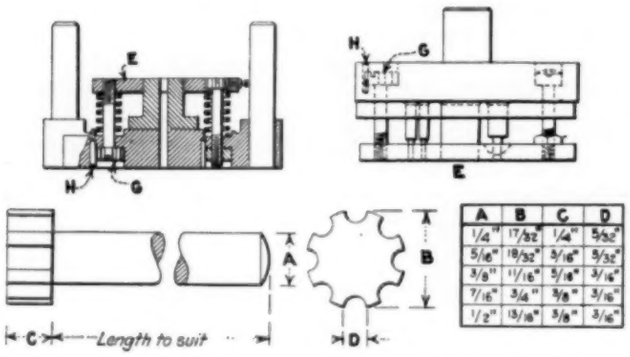
BY DONATO ZAZZARA

The method of holding strippers for sub-press and blanking dies, blankholders, etc., herewith illustrated and described, is simple in construction and satisfactory in use.

In the illustration of a sub-press die and a piercing punch the reader will note a comparison of the method with that more commonly used; the new to the left, the old to the right.

The stripper *E* is tapped for the holding screw *G*, which has a special head with eight shallow grooves equally spaced about the circumference. After the proper position of the stripper is determined, the small setscrew *H* is inserted in the die bottom, one half fitting a groove in the head of the holding screw. This keys the holding screw securely to the die bottom, with no possibility of its turning, so that the original position of the stripper is maintained regardless of how much pounding the die receives.

A distinctive feature of this construction is that it offers a means of adjusting the location of the stripper accurately and quickly. By removing each setscrew and turning each holding screw an equal number of grooves,



A	B	C	D
1/4"	17/32"	1/4"	5/32"
5/16"	19/32"	5/16"	5/32"
3/8"	11/16"	5/16"	3/16"
7/16"	3/4"	3/8"	3/16"
1/2"	13/16"	3/8"	3/16"

SIMPLE AND SATISFACTORY METHOD OF HOLDING SCREWS IN STRIPPERS

one may be certain the relative position of the stripper is correct. Practice will soon teach the proper amount of rotating to give the holding screws in order to obtain any desired adjustment of the stripper.

Comparison of this simple means with the ordinary method shows two parts against five. With the old method constant vibration often loosens the locknuts and allows the stripper to become displaced, sometimes with disastrous results.

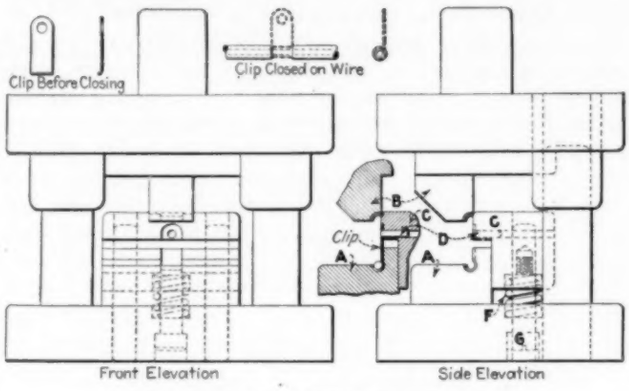
Should the reader decide to adopt this plan, details of the special screws are shown which have been proved to be well adapted to the purpose.

Unique Clip Rolling Die

BY EDWARD H. TINGLEY

The Delco-Light Co., Dayton, Ohio, has developed and is successfully using a clip rolling die to close a brass clip around a stripped electrical wire, preparatory to soldering. The clip, of 0.031-in. sheet brass, is blanked, partly formed and the end curled to a quarter circle before going to the rolling die. The wire around which the clip is rolled is first stripped of the insulation at the places where it is desired to have clips, and after assembling, the joint is soldered to make a tight electrical connection.

The sketch shows the construction of the die. The



TOOLS FOR ROLLING CLIP ON WIRE

lower forming block *A* and the upper setting block *B* are both recessed to the proper diameters to care for both the insulated wire and, at the working part of the die, the clip and bare wire. Block *A* and the sliding receiver *C* are both recessed to hold the clip, to a depth no greater than the maximum thickness of the sheet brass of which it is made. *D* is the locating and supporting pin that fits in the hole of the clip.

The clip is placed on the pin *D* and in the recess of block *C*. The wire is laid in the block *A* at the proper place. The upper setting block *B* descends, holding the clip in the recess in *C* until *B* hits the top of *C* when both *B* and *C* move downward against the tension of spring *F* and start to curl the clip around the wire. Further downward motion brings *B* in contact with *A*, when the clip receives its final set.

On the return stroke the blocks *B* and *C* and the wire and clip all rise together until the screw *G* holds the block *C* from going any higher. Block *B* continues to rise to the end of the stroke of the press. Clip and wire are then free to be removed.

This die is designed to be used on a No. 19 Bliss inclinable press. The incline serves to hold the clip on the pin until the die descends. Excellent results have been obtained with this die as the clip comes out perfectly flat.

Height-Gage Lines

BY GUSTAVE A. REMACLE

The modern height gage is a very serviceable instrument and the degree of accuracy which can be attained when working directly to lines scribed by it depends largely upon two things—the workman's skill as a mechanic and his knowledge of the form of a height gage line.

It seems to be a general habit to regard a height-gage line as merely a line, light or heavy, straight and accurately laid off. However, owing to the peculiar form of these lines, their width and lack of uniformity of width affects the accuracy with which points may be marked off in relation to certain other definite points.

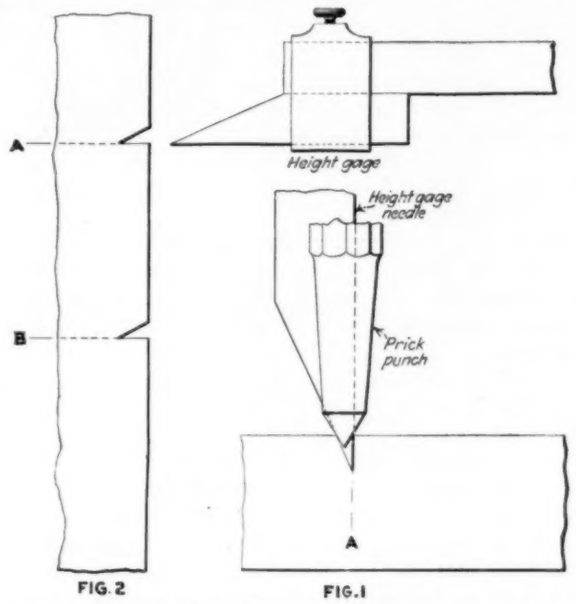
In Fig. 1, I have sketched a magnified cross-section view of a height-gage line together with a prick punch ready to strike off a center in the wrong place. Before the peculiar structure of such a line occurred to me, I had often noticed that when I had bored a number of

holes, by means of wiggling from prick punch marks, I succeeded in obtaining the desired positions of the holes in relation to each other, while a few thousandths of error existed in relation to the original striking-off point which would usually be the top or bottom of the piece, or some projection.

In the accompanying sketch, *A* represents a line which should be the center of a hole to be bored. If a line has been laid off which is 0.004 in. in width, it can be plainly seen that error is bound to result even though the greatest care is observed with other operations.

Owing to the form of a height-gage needle, this error cannot be removed entirely but it can be reduced to a minimum by having the needle sharp and by marking off light and uniform lines.

When a prick punch mark is to be made at the intersection of lines, the accurately ground prick punch should be placed gently into one of the lines and then moved along until the point rides into the intersection. A very slight click can be felt when this happens. Before striking the prick punch with a hammer, the prick punch should be held in a vertical position and pressed downward by hand. This will produce a tiny mark



FIGS. 1 AND 2. MAGNIFIED HEIGHT-GAGE LINES

which can be observed with a magnifying glass. If this mark appears to be accurately made, the punch can then be placed in position and tapped with a hammer.

Another manner in which toolmakers work directly to height-gage lines consists of making an outline with height gage, scriber, dividers and trammel points and then working to the lines. This method is much practiced in the die-casting game. Here again if these various lines are regarded merely as lines, error will occur in accordance with the width of the lines.

In Fig. 2 I have shown a magnified cross section view of lines which have been marked off from some other point of the work with a height gage. It is essential that a depression be milled between points *A* and *B*. The reader can see at a glance that if accuracy be desired, line *B* should be entirely milled away while in the case of line *A*, the cutter should be worked in until it just grazes the line, removing none of it.

Scriber, divider, and trammel points each make lines peculiar to themselves and if error is to be minimized these instruments should be kept sharp and light lines should be made. Also, when working to the line the cross section form of the scribing point should be kept in mind. When I strike off lines with the height gage, I often mark that part of the die plate which is up during this proceeding because it would be a difficult matter to determine which lines should be milled away, and vice versa, after once the work is set up.

A Simple Cylinder Grinding Rig for a Lathe

BY CHARLES BROWN

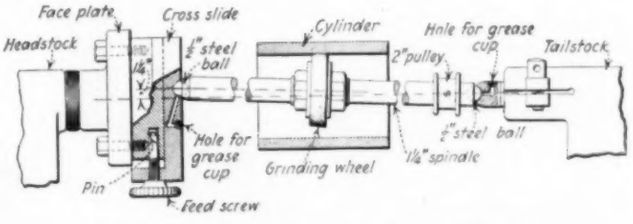
The writer has found the device, herewith illustrated and described, to be very useful in his small shop for the purpose of grinding out automobile and other cylinders. While he does not attempt to compare it with any of the standard cylinder grinding machines on the market in quantity of output, he believes it to be about the limit of simplicity and low cost of construction for such shops as cannot afford to have one of the standard machines.

An arbor of suitable diameter and length to handle the work required of the device, is cupped at each end to take a standard ½-in. bearing ball. A 2-in. flanged pulley is pinned to the arbor quite near to one end and, at the middle of the arbor, right- and left-hand collar nuts are fitted to hold a suitable grinding wheel between them.

The arbor is supported in the lathe by a cupped center at the tailstock end and at the other end by a block having a similar cup on its outer face and fitted to slide radially in a suitable piece that is bolted to the faceplate. By means of a knurled adjusting screw the bearing block can thus be moved in or out from the center and thereby change the radius of the circle described by the gyrating wheel.

As the driven pulley is so near to the fixed tail center the "drunken" motion is not sufficient to seriously affect the somewhat long driving belt, which comes from an auxiliary counter overhead. The arbor runs 6,500 r.p.m., and the maximum amount of offset obtainable at the faceplate end is 1¼ in., giving a scope of adjustment at the wheel of approximately ⅝ in. These dimensions can, of course, be made to meet expected requirements. With this device I have enlarged by 0.012 in. the bore of a cylinder 3¾ in. long in 19½ minutes.

[Though our correspondent does not say so, it would seem necessary to redress the periphery of the grinding wheel after each increment of setting, as the corner of the wheel nearest the faceplate would, of course, advance faster than the opposite corner and thus alter the



INTERNAL GRINDING RIG FOR LATHE

bearing of the wheel upon the work. Also there would seem to be need of compensating for the changing distance between centers as the adjusting block was moved along its slide.—Editor.]

EDITORIALS

Dangerous Economy

CONGRESS has succumbed to another violent attack of economy. Not content with the excellent achievements of our negotiators at the Disarmament Conference, it has threatened to undo most of the work done there by cutting the Navy personnel from Secretary Denby's conservative estimate of 90,000 men to 65,000. To maintain the 5-5-3 ratio to the full, would require 130,000 men.

No business man will find fault with a genuine effort on the part of anyone connected with the Government of the United States to effect economies in the operation of government functions. On the contrary he has used every means in his power to urge such economy. But the present movement to scuttle the Navy by reducing its personnel below the point at which it is barely possible to maintain efficiency, is neither sincere nor an economy in the long run.

Look at what happened to the Rivers and Harbors Bill—increased by $15,000,000. An increase in almost any other appropriation would not be such conclusive evidence of the workings of the politician's mind, but the manipulation of these particular funds has long been infamous. We venture to predict that the usual $350,000 for free seeds will get back into the appropriation bill before it reaches the President. No other proof of the lack of sincerity is needed. There is an election next fall.

But what of the ultimate effect of such a reduction in the Navy? Have the American people forgotten so soon how long it took and what it cost to get our unprepared Navy into action? It was not an achievement to which many of us care to "point with pride." A few millions spent before 1917 in maintaining the efficiency of the Navy would have saved many millions spent later in trying to make up the lost ground. Any machine deteriorates rapidly when maintenance is neglected.

The AMERICAN MACHINIST has supported the position taken by the United States in calling together the Disarmament Conference and in making the tremendous sacrifice which alone made the negotiations successful. That sacrifice was necessary to prove the good faith of this country in its plea for reduction of naval armament, and was only made on condition that corresponding sacrifices, even though smaller in size, were also made by England and Japan. It was a business-like compromise in which each party gave up something for the benefit of all. The reduction of the Navy personnel is nothing of the sort, it is simply a wild, regardless-of-consequence slash at appropriations so that the candidates can go before their constituencies with a record of reduced expenditures at which to point.

We feel confident that we voice the opinion of the machinery industry when we say that we fervently hope that this country will never be engaged in another war, but we are equally confident that the industry does not believe that the way to peace lies in the disarmament of the United States while other nations maintain their military establishments. We hope that this country can and will call other conferences looking to further limitations of armament, and eventually to universal peace, through universal confidence and understanding, but we do not believe that much can be accomplished by a big and wealthy nation without means to defend itself. Human nature doesn't work that way.

No doubt you will agree with what we have just said; most thoughtful Americans will, but your opinion will have little effect unless your representative knows what it is. Tell him.

How the Buyer of Machine Tools Increases the Sales Price

ANY general manager will admit that the cost factor hardest to figure is the cost of sales. He can easily get accurate figures on production costs up to the time the machine is ready to ship—but the cost of getting the order is almost an unknown quantity. It varies from almost zero, when the customer writes or wires the order without solicitation, to as much as 50 or 60 per cent of the selling price when the sale requires special treatment and much expense in travel.

The buyer, in other words, largely determines the price by the cost to which he subjects the maker in making the sale. If the buyer makes it necessary for the seller to make several long trips, if he delays him unnecessarily, if he subjects him to expense in any way, the buyer in the end pays the bill. There is no other way. Every cantankerous buyer who boasts that he is a hard man to sell, is adding to the cost of machines bought by himself and everyone else.

We must also get over the notion that the buyer is conferring an everlasting favor on the seller. It is frequently the other way around. In the case of machine tools the buyer secures a machine which he uses indefinitely to produce a profit for himself. Is not the favor on the other side, if at all?

Whatever the sale, each side should benefit. If the seller did not prefer the money to the machine he would not sell. If the buyer did not prefer the machine to the money he would not buy. And whatever adds to the cost of making the sale hurts the buyer more than the seller, for in the long run the cost must go into the price of the machine.

Use One-Way Tolerances Only

WE HAVE been thinking of plus or minus tolerances for so long that many do not seem to realize they belong to the dark ages of interchangeable manufacture.

The advantages of the one-way tolerances are many. With holes or all similar surfaces made basic, *plus* the given tolerance, and all plugs and similar mating surfaces made basic, *minus* the tolerance, much confusion is avoided and mechanical operations are made more simple.

The standard hole, with the basic size of the mating

part enough smaller to allow the necessary clearance for lubrication or for other reasons, is now the basis of most interchangeable machine manufacturing.

Both the Newall system in England and the Johansson system in Sweden are based on two-way, or plus or minus, tolerances. Ludwig Loewe & Co. in Germany also used the two-way, or bi-lateral system, for twenty years. But the advantages of the one-way system were so great that, despite the cost and other difficulties in the way, they have now adopted the one-way system.

Similar action is being taken in France and Switzerland and, with the progressive firms in the United States working along the same line, it looks as though the one-way method of tolerances would soon be standard the world over.

Get into the habit of thinking of one-way tolerances only. See that drawings and blue prints are properly marked and help along the good work.

Which Kind of Ton?

THE American Institute of Weights and Measures is now advocating that in all references to tons, short ton or long ton be specified. In America there is little reference to the long ton, frequent reference to the short ton. The obvious way to designate the short ton of 2,000 lb., is the way suggested by the institute, namely, to use nothing but the word "ton." The long ton of 2,240 lb. could then be designated by the word "L-ton."

The AMERICAN MACHINIST has approved the suggestion and will from now on, whenever referring to the long ton, use the expression "L-ton." The short ton will be designated by the word ton without any modification.

It is further suggested by the institute that if circumstances demand it, a ton of 2,000 lb. could be designated by "S-ton." This is especially recommended in trade with Great Britain and its colonies. It seems that such a recommendation is sound and should be followed in dealing with foreign countries using the ton of 2,240 pounds.

False Economy

TO a certain class of buyer the appeal of the second-hand machine is irresistible. The saving of twenty-five or thirty per cent of the cost of a new one is too much for his bargain counter mentality to resist and he falls for a purchase, the value of which is at least open to question.

These remarks are in no sense disparaging to the small shop proprietor who cannot scrape money enough together to buy new equipment, nor to the reputable concerns which render a real service to men of his type by selling re-conditioned machines of standard make with complete equipment. Such dealers are in business to stay and their dealings are entirely legitimate.

Unfortunately, there are others in the machinery business whose principles are not so praiseworthy. How they cheat the unsophisticated buyer is indicated by an article in the last issue of the organ of the British Machine Tool Makers' Association. Special shell lathes, some with but one spindle speed, others without power feed, still others equipped only for special jobs, are catalogued as standard models by shyster dealers.

Here is but one instance of dishonest methods, but it should be sufficient to show the danger for the unwary that lurks in buying from unknown dealers in "as is" equipment. Is it worth the money to pass up the service that goes with a new machine, or a guaranteed re-built one, the assurance that the machine is perfect and the unquestionably better performance it will give, for such a risk?

The Reward of the Kicker

IT IS unfortunate, but true, that many of the favors in this world go to those who make the loudest noise. The pleasant average citizen who doesn't complain if his eggs are ancient or his meat is underdone or his apple pie is forgotten and who treats the waiter as though he were a human being, usually waits for his service until the loud-voiced complainer who finds fault with everything in sight has been pacified. Of course it isn't right, but that's the way it happens.

In other words, if you want service you very often have to ask for it or even demand it, particularly if the service is to come from a municipal, state or federal organization. Some such situation is likely to face the machinery men of the country before long, as the result of the curtailment of the requested appropriation for the Bureau of Foreign and Domestic Commerce. We commented last week on the favorable significance of the fact that an increase, small though it was, had been granted to the Department of Commerce by Congress. It was a well-earned recognition of valuable service.

However, because the increased appropriation for the bureau is still too small for its requirements, there may have to be a revision of plans by the director. In case of such a revision somebody's service is going to suffer and if events follow their usual course, that somebody will be the quiet, deserving group which fails to make its needs known.

That the Bureau of Foreign and Domestic Commerce through its Industrial Machinery Division has been a valuable aid to American machinery manufacturers and merchants since its inception, has been amply proved. What it may do in the future has hardly been imagined, let alone planned, as yet. Foreign trade bids fair to be the next great line of development for the activities of the United States and the men of the machine industry should be foremost in the advance.

Under the circumstances it will do no harm and may do much good, to let the director of the bureau know that you value the work of the division assigned to you and want its work continued and expanded.

Saving the Air Mail

NOW that the Senate has restored the appropriation for a continuation of the Air Mail Service, it is up to the House of Representatives to acquiesce as they have done on several previous occasions. The amount of the appropriation, $1,900,000, is inadequate; but we will be thankful for that because so much of our future in commercial aviation depends on it.

Transportation, perhaps more than anything else, affects all business dealings. Commercial aviation will play a much more important part in future development than many realize. Anything which can legitimately be done to further it should have our unqualified support.

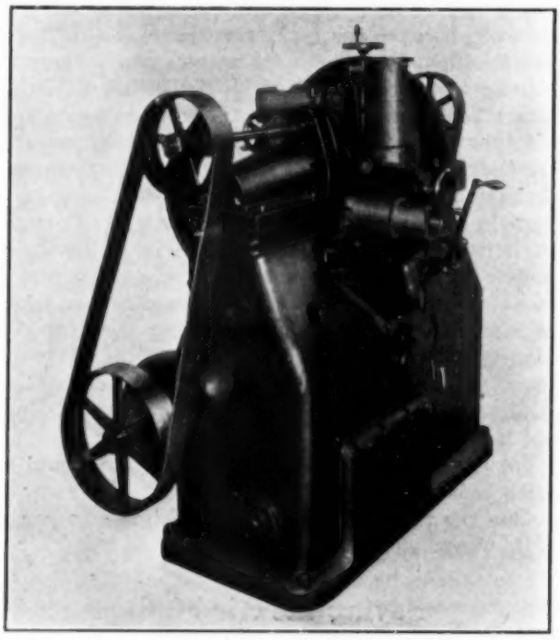
It is hoped that the House of Representatives will agree to this appropriation without further delay. If they do not, it behooves us all to see that our representatives are made acquainted with our belief in the need of this, in a positive manner. The Air Mail must continue and with it a development of suitable commercial planes.

Shop Equipment News

Manufacturers' Consulting Engineers Two-Way Boring Machine

The machine shown in the accompanying illustration is intended for boring simultaneously both sides of the work. It has recently been placed on the market by the Manufacturers' Consulting Engineers, McCarthy Building, Syracuse, N. Y. It is intended especially for boring, bottoming, and reaming both the exhaust and the intake ports of gas-engine cylinders, although the same type of machine is applicable to many similar operations.

The machine is motor driven, and is semi-automatic in operation. The workholder to which the cylinder blocks are clamped accommodates four cylinders, and is arranged to rotate about its central axis. The multiple heads at the two ends of the machine are fed toward the center simultaneously, where they finish the work and then return to their outer positions and come to



MANUFACTURERS' CONSULTING ENGINEERS TWO-WAY BORING MACHINE

rest. In this way, the ports on both sides of the cylinder are finished at the same setting.

The workholder is then indexed to the next position, and the feed for the heads engaged by a hand lever so that the cycle is repeated. Loading and unloading of the work is done while the machine is in operation, so that the only idle time of the machine is that required to move the workholder from one position to the other. The machine is capable of machining the castings as fast as the operator can supply them.

The cycle of operations requires 20 sec., in which time one cylinder block is completely bored, bottomed, and reamed on two sides. Two holes $1\frac{7}{8}$ in. in diameter and 1 in. deep are held to 0.001 in. limits in diameter and plus or minus 0.005 in. in depth.

Van Norman Re-li-o No. 2 Bench Wet Grinding Machine

The Van Norman Machine Tool Co., Springfield, Mass., has recently adapted its "Re-li-o" bench grinding machine, such as described on page 776, Vol. 55, of AMERICAN MACHINIST, to wet grinding. The machine is thus suitable for the use of cylinder regrinding shops and piston distributors, where rapid production on a semi-manufacturing basis is necessary. Oversized pistons can be reduced quickly to fit the diameter of re-ground cylinders.

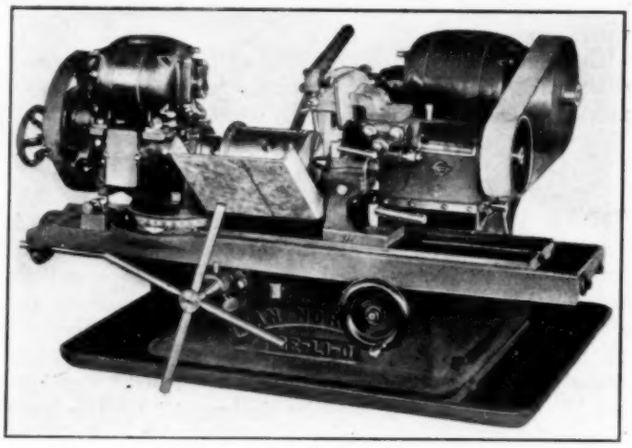


FIG. 1. RE-LI-O NO. 2 WET GRINDING MACHINE

In Fig. 1 can be seen a front view of the machine equipped with a water guard. A pump, tank, guards and piping for flood lubrication are provided. The location and the method of drive of the pump are well shown in Fig. 2. The wheelhead is equipped with a $\frac{1}{2}$-hp. electric motor carrying an 8 x $\frac{3}{4}$-in. abrasive wheel. The wheel slide is made longer than in the dry type of machine, so as to insure greater rigidity.

The tool-holder mounted on the front of the wheel-

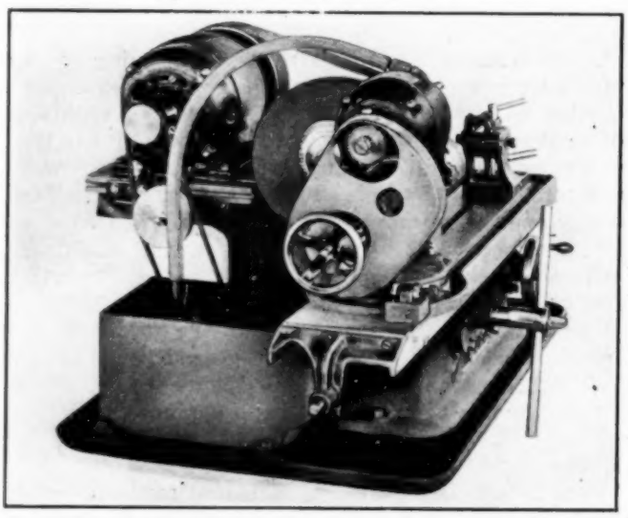


FIG. 2. WORK HEAD END OF RE-LI-O NO. 2 WET GRINDING MACHINE

slide can be swung into and out of the operating position without changing the position of the set-up or dismounting the grinding wheel. It is thus possible to remove a considerable amount of metal from the work by means of the turning tool, and then to swing the tool out of position and finish the work by means of the grinding wheel. The piston can thus be brought to size quickly without distorting it. The work is ordinarily held on a bull center or on an adapter, and the tailstock center is used as an additional support. The wheel is not rotated while the lathe tool is cutting. The toolholder can be entirely removed if it is not needed.

The machine is made heavier in some parts than the dry grinding machine. It has a more substantial locating and clamping device for use when turning the work spindle at an angle, or in securing it parallel to the ways. An adjustable stop is provided to maintain the proper position of the table.

The machine is adapted also to the grinding of wristpins, valves, reamers, and such small work requiring either cylindrical or taper turning operations. It is adaptable also to use in toolrooms and experimental shops. Its net weight is 600 pounds.

Union Portable Universal Saw Bench

In the illustration is shown a small, portable, universal saw bench that has recently been placed on the market by the Union Machine Co., Grand Rapids, Mich. The machine is adapted to use in pattern and woodworking shops, and is capable of handling stock up to 2 in. in thickness. It can be mounted on a bench, although it is ordinarily furnished on the base, as shown.

The base is provided with rollers, one of which is so controlled by the operating handle that it can be raised and the two legs of the base rested directly on the floor. The device can thus be very easily moved from one location to another. It derives current from a lighting circuit, so that it can be connected to a convenient socket. A ½-hp. motor drives the 7-in. saw.

The frame of the machine is a one-piece casting. The table is cast iron, 20 x 18 in. in size, and can be tilted to any angle up to 45 deg. and locked in place. Graduations are provided to facilitate the setting. The bolt connecting the motor and the saw is covered by a guard, and a device is provided for varying the belt tension. The saw may be furnished for either ripping, cross cutting, or combination work. The position of the guard covering it is adjustable, so as to provide room for the desired thickness of stock to be cut.

The arbor of the saw runs in ball bearings at a speed of 5,000 r.p.m. The arbor yoke is hinged, so that it can be raised and lowered to permit the saw to project above the table only the desired amount for the job being performed. Dado heads up to ⅝ in. wide and of 6-in. diameter can be carried. The metal throat plate is removable, so that hardwood throat plates may be inserted when using dado or grooving heads.

The cross-cut gage can be used on either side of the saw in the two slots in the table. It can be set and clamped at any angle. The ripping gage is machined on both sides and can be used on either side of the saw. It is locked in position and lined up with the saw automatically when the lever-head screw is tightened. A splitter guard is provided to prevent the stock from pinching the saw.

A switch for starting and stopping the machine is located on the front of the base. The machine is only 10 in. high in the bench style and 36 in. when mounted

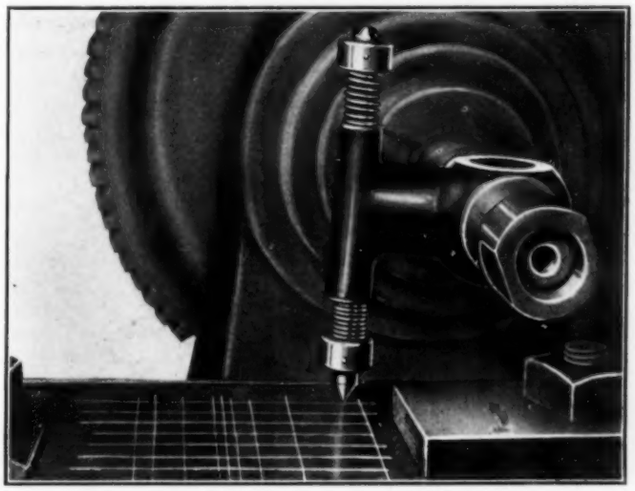
UNION PORTABLE UNIVERSAL SAW BENCH

on the base. The net weights of the two styles are 133 and 268 lb., and the weights crated 170 and 330 lb., respectively.

Johnson Center-Locating Punch

A combination prick punch and scriber for precision work in laying out centers for holes in jigs and dies has recently been placed on the market by Bernard F. Johnson, 3476 Boulevard, Jersey City, N. J. It is not necessary to employ buttons in laying out holes, as is ordinarily done. Holes can thus be placed very closely together, and the punch marks can be made in the desired positions without the possibility of interference that may occur between buttons.

The tool can be used in conjunction with a shaper, milling machine or other machine tool. Ordinarily, it is mounted on the cutter arbor of a milling machine, as



JOHNSON PRECISION CENTER-LOCATING PUNCH

shown in the illustration, with the punch either perpendicular or horizontal. The work is attached to the machine table, and is moved by means of the machine controls. The operator observes the movement by means of the graduated dials on the screws of the machine, so that the required dimensions between marks may be easily obtained. After each adjustment of position, a prick mark can be made on the work by tapping the rear end of the punch with a hammer. When all the centers have been properly located, the work may be removed from the milling machine and held on the face-plate of a lathe. The ordinary method of indicating, drilling and boring the holes can then be applied.

It will be noted that movement of the punch stem in either direction is possible, the springs normally holding the tool at rest. The device may be employed in conjunction with a dividing head, where it is desired to swing the work about a center. The center point may be used as a scriber for marking lines directly on the work. The springs in this case serve to keep a constant pressure of the point against the work. As the part is moved by means of the machine controls, continuous lines may be made, so that the die can be easily laid out. A thin line is scratched by the point, which is hardened and ground all over.

The tool is of especial use when laying out cams, as the outline can be accurately drawn on the work before cutting is started. The two collars on the ends of the punch are of equal size, so as to facilitate alignment of the tool. As shown, the holes in the arm of the device are $\frac{3}{4}$ and $\frac{7}{8}$-in. in size, for mounting on the arbors of milling machines.

State Universal Saw Bench

A universal saw bench for use in pattern, cabinet and carpenter shops, and in shipping rooms and foundries has recently been developed by the State Pattern and Machine Co., 2824 West Lake St., Chicago, Ill. The machine is intended primarily for use on wood, but can be employed for such purposes as sawing carbon, asbestos, fiber and even soft metal.

STATE UNIVERSAL PORTABLE SAW BENCH

The machine can be supplied with either a tilting or stationary table. The motor is of $\frac{1}{2}$ hp., either Emerson or General Electric make, 110 or 220-volt, and for either a.c. or d.c. The height is 34 in., and the diameter of the saw is 8 in. The saw can be raised or lowered, and provides a maximum depth of cut of $2\frac{1}{4}$ in. The speed is 3,500 r.p.m. A guide is furnished which can be used on either side of the saw.

A guard is supplied which consists of several thin aluminum plates so arranged as to swing easily as the work is pushed past the saw, but to prevent entrance from the side or from above the saw. The machine is equipped with S. K. F. ball bearings. The endless belt is adjusted by means of a special device. The machine can be operated from an electric light socket.

Erratum

The address of the Frank O. Wells Co., Inc., of Greenfield, Mass., was incorrectly given as Springfield, Mass., in an article entitled the "Wells Screw-Plate Set" on page 494.

Reconstruction Hospital To Have Enlarged Facilities

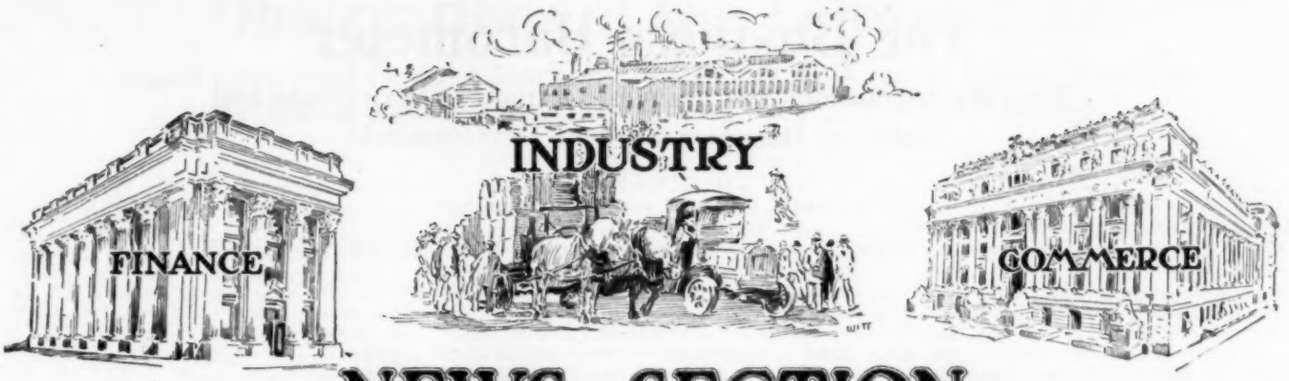
As a direct result of the world-wide experiments in rehabilitation of men injured in war, America has now a hospital dedicated solely to the care of industrial diseases and accidents and the restoration of industrial casualties to active useful life again. Ground was broken on April 2, for the new eleven-story addition to the Reconstruction Hospital at 100th St. and Central Park West, New York City.

It is a new idea to have a hospital where men suffering from any of the many casualties of industry may receive the benefits of an intensive study of their cases by surgeons specializing in all the newest forms of therapy, combined with the complete after-care of the patient until he is fit to earn a livelihood. Yet in the brief life of the present hospital, men have been sent from all over the country to take advantage of its unusual treatment, and many suffering from seemingly incurable physical ailments and distortions have been returned to useful industrial life again.

Besides the usual equipment the new hospital will have the most extensive and complete physio-therapy plant in existence. There will be rooms for occupation therapy, especially designed equipment embodying the latest principles in rehabilitation, electro-therapy, and mechanical apparatus, whirlpool baths, and a gymnasium where a score of mechanical devices assist the patient in recovering the fullest use of stiffened joints and weakened muscles.

The total cost of the new annex will be $1,500,000. It is hoped to complete the first two stories at once to relieve the pressure on the present hospital in which an average of 175 cases receive treatment daily, half of that number being sent by the Government.

Officers of the governing board of the hospital are: President, W. Gilman Thompson, M.D.; chairman of the board of directors, Allen Wardwell; vice-presidents, John A. Hartwell, M.D., and Giraud F. Thomson; treasurer, Edward M. Townsend; secretary, Elwyn W. Poor.



NEWS SECTION

Defendant Asks Rehearing of Open-Price Case

Rehearing of the open-price association practice in trade, or modification of the decree in the hardwood lumber case, to permit of the collection and dissemination of production, sales and stock reports, has been requested of the U. S. Supreme Court in a petition filed by the American Column and Lumber Co., defendants in the recent suit in which the court decided the practice was illegal because in violation of the anti-trust law. The lumber interests base their request on misinterpretation of certain phases of the case, and make general denial of the conclusions of the court that the purpose of the practice employed by the lumber interests was to curtail production or enhance prices.

Exhibit Road Machinery in South America

An exhibit is being planned by the Bureau of Public Roads of the United States Department of Agriculture, to be shown at the international exposition to be held at Rio de Janeiro, commencing next September, to stimulate trade in American made road machinery and motor vehicles. Models showing various steps in the construction of a road, colored transparencies and motion pictures will be used to illustrate American methods of road building. Manufacturers of road machinery and equipment are invited to exhibit.

The exhibit is also to cover highway transportation and this field will be covered by models being prepared by the National Automobile Chamber of Commerce.

Court Upholds Sugar Machinery Importers

The U. S. Court of Customs Appeals has decided the case of Cotton, Weill & Co., Ltd., involving the duty on centrifugal machines for use in the manufacture of sugar. They were assessed on importation, as dutiable by the collector of customs. The importers protested on the ground that the articles were knocked-down entireties and entitled to free entry as machinery for use in the manufacture of sugar. The Board of General Appraisers overruled their protest, but the court reversed its decision, sustaining the contention of the importers.

Annual Convention of Metal Trades

The twenty-fourth annual convention of the National Metal Trades Association will take place at the Hotel Astor, New York, on April 19 and 20. The program for this year, it is reported, is in many respects the most attractive which the association has ever been able to offer to its members and friends, subjects having been selected which it is felt everyone is vitally interested in at this time.

Among the subjects of importance to the metal trades which will be discussed at the convention, is that of training apprentices to be skilled all-round workmen. A committee on apprenticeship has been investigating the systems of various industries and will report at the convention.

Conditions in the coal mining industry and on the railroads will be discussed by speakers of national prominence; finance; the relation of the farmer to industry; the progress which the city of San Francisco and other large cities have made in emancipating themselves from labor union domination; future industrial conditions in the light of the European situation—are some of the subjects which will also be dealt with. Some of the speakers will be: Robert M. Lynch, of San Francisco; Harold G. Moulton, Chicago; Magnus W. Alexander, New York; E. L. Greever, Tazewell, Va.; James A. Emery, Washington, D. C.

The part played by the non-union coal operators of West Virginia in stabilizing conditions in that industry will be fully outlined by the Hon. E. L. Greever, of Tazewell, Va., counsel for the non-union mine operators of that district. Mr. Greever handled all legal matters arising out of the insurrection of last September. In view of the present labor difficulty in our coal mining industry, the subject is timely.

Ordnance Stores Moved

Under an appropriation of $1,642,351 made available by Congress in a deficiency bill, and approved by the President, the War Department is transporting ordnance stores to permanent storage points incident to the evacuation of ordnance depots of a temporary character heretofore maintained at South Amboy, Hammonton and Westville, N. J.; Middletown and Tullytown, Pa.; Seven Pines and Penniman, Va.; Sparta, Wis., and Toledo, Ohio.

Imports of Industrial Machinery in Egypt

A statistical study of Egyptian imports of industrial machinery in the last three years, just completed by the industrial machinery division of the Department of Commerce, shows that such imports from the United States in 1921 constituted 29.6 per cent of the total, compared with 12.3 per cent in 1920 and 15.6 per cent in 1919.

Egypt is not an industrial country, and the market for machinery is restricted. The most important Egyptian customers for such machinery are the various branches of the Egyptian government. The largest item on 1921 imports, after rail locomotives, was stationary internal combustion engines, valued at £302,762, of which the United States contributed only £4,614.

Rate Cut Not Ready

The decision of the Interstate Commerce Commission in the matter of a general reduction in rates, it now appears, will not be forthcoming before April 15. At present the case is being studied by the commissioners individually. If they should find themselves in substantial accord, the decision probably could be handed down as early as April 15, but should there be important differences between them, it obviously will extend the time required.

President Holds Up Patent Treaty

Action by the Senate authorizing the President to revive the patent convention entered into with Germany in 1909 has raised a storm of protest. As a result it seems probable that the President will withhold, pending an investigation, the notice reviving that treaty.

The 1909 patent convention with Germany provides that, in case the United States should amend its patent laws by the insertion of a working clause, this legislation would not apply to patents of German origin. The agreement is reciprocal.

There are certain American industries which are anxious to have this reciprocal safeguard, but the arrangement is regarded as being a very detrimental one to the chemical industry.

Chief sentiment for the revival of the treaty of 1909 is said to exist in the electrical industry.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

By THEODORE H. PRICE
Editor, *Commerce and Finance*, New York

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It is estimated that from 300,000 to 500,000 miners and 70,000 textile operatives are on strike, but the fact that these two great strikes have not seriously affected business attests the stolid confidence in the future that is now generally felt. The apparent unconcern of the public is due to a widespread belief that an adjustment by compromise will soon be reached and that a vacuum is being created in the supplies of cotton goods and coal that argues higher prices later on.

Concurrently the railroads are doing better, and Februray net earnings are substantially in excess of earlier expectations. Many other signs of increased activity are also to be noted. The Western Union Telegraph Co. reports a substantial gain in the number of messages handled, and the telephone toll business, local and long distance, is said to be at its peak.

Upon the theory that a nation wide improvement in business is impending, the financial markets have been active and buoyant. A large number of bond issues, including one for Czecho-Slovakia and another for the Republic of Santo Domingo, have been readily absorbed. The Victory war bonds have sold above par and most of the Liberty issues have crossed 99. On the advance a great many small holdings have been marketed and the money thus released is apparently being invested in other securities that promise a higher return and have greater speculative possibilities.

Speculation Rife

The many letters asking for my advice with regard to speculative investments that I have recently received indicate that the spirit of speculation is spreading, and the fact that some of my correspondents seem angered by my answers urging them to put their mony in a first mortgage on improved real estate is proof that the temptation to take a chance in the hope of making something more than compound interest is again becoming irresistible.

As the contagion of speculation spreads and the public becomes excited a further advance in the stock market is quite possible, if not probable. But even if I were willing, as I am not, to take the responsibility of recommending the purchase of any particular security I should feel impelled to point out that the stock market is now in the secondary stage of a bull movement. As it advances sharp reactions that will make marginal operations more and more dangerous are to be expected.

I feel at liberty to speak this word of caution because during the dark days of the past twelve months I was persistent in predicting that the golden flood by which the country has been inundated would ultimately submerge the wreckage of the late depression, and now that the conditions that I expected have developed the prudent should be on their guard lest they become the victims of a thoughtless public enthusiasm.

Of the commercial and industrial future it is possible to speak rather more confidently than of the stock market. The steel mills are running at 70 per cent of their capacity. The indications favor a further gain. The railroads are buying more freely and the building activity is almost phenomenal. In greater New York 27,839 apartments or tenements containing 107,054 rooms are in process of construction. From many other cities a similar building boom is reported. It is reflected not only in the demand for structural steel but in the sales of brick, cement and other building material. In one forenoon last week 16,500,000 brick were sold in New York, and the price of cement has risen to $2.90 per barrel. The shortage of housing will soon be a thing of the past and landlords are rather less exigent in their demands.

An improvement in the jewelry trade is another sign of returning prosperity. The diamond cutters are busy again for the first time in two years. A further advance in coffee which has carried the May option to nearly ten cents a pound, the rapidity with which the Cuban surplus of sugar has been distributed at advancing prices and a slight improvement in the market for crude rubber, which is said to reflect an increased demand for tires and automobiles, are other straws in the current of the commodity markets which indicate a greater willingness to buy on the part of the public.

Cotton has fluctuated within comparatively narrow limits. A prominent trader says that the market is "buffaloed" by the textile strike and the premium of 50 points on the May option in New York. It is said that this position has been cornered by a group who are reputed to hold contracts for the delivery of 750,000 bales.

The dry goods market is somewhat firmer but it is to some extent paralyzed by the strike and the artificial conditions which exist in the market for the raw material. It is, however, admitted that the shelves of distributors are very bare of cotton goods and their replenishment by active buying seems to be only a question of time.

Sales of fertilizers are rather below last year's figures and current guesses are that the acreage will be increased by not more than from 3 to 10 per cent.

Waiting for Russia

The grain markets are hesitant. Their future depends upon crop development and the outcome of the Genoa conference. Some think that if Russia is accorded commercial recognition there she might again become a large producer and exporter of wheat.

Lloyd George's Parliamentary victory, following his remarkable speech, has revived the hope of early and rapid recovery in economic conditions abroad. The market for foreign exchange is in consequence generally firmer, but German marks continue "droopy" at around 30 cents a hundred. The paper circulation of Germany has been increased by nearly eight billion marks and now stands at over 130 billion.

There has been a sharp advance in Mexican bonds. Many think that it presages President Harding's recognition of the Obregon government. It seems to be generally agreed that conditions in Mexico are decidedly better.

In Washington the best political opinion is that the Senate will pass the bonus bill with an amendment for the imposition of a sales tax. The folly of this course, if it is followed, is fully appreciated, but business men realize that the first effect of the proposed legislation, if it is enacted, will be inflation and higher prices. For this, most of them are, consciously or unconsciously, preparing. After the proposed largesse to the soldiers has been distributed and spent the prostration which always succeeds artificial stimulation will no doubt follow. Prudent men should therefore be prepared to step off the train when it commences to slow down, but as it has just started it may be unwise to look too far ahead.

The weekly statement of the Federal Reserve Banks shows an increase of nearly $8,000,000 in the gold held, but the reserve ratio is practically unchanged at 77.7 as against 77.8 per cent last week.

Government Sale of Standard Airplanes

Notice has been received from the office of the Chief of the Air Service, War Department, Washington, of the sale of a lot of standard J-1 airplanes and hangars. Sealed proposals for the purchase of these airplanes will be received at the material disposal and salvage section, Office of the Chief of Air Service, Room 2624, Munitions Bldg., Washington, D. C., until 3 p.m. Tuesday, May 2.

The airplanes are stored in the Aviation General Supply Depot, Houston, Texas. The equipment consists of fourteen standard J-1 planes which have never been used. These planes are not equipped with engines. Another lot consists of fifteen standard J-1 planes, not equipped with engines, which have been used and which need minor repairs. All the planes in this section are equipped with gasoline tanks, hand pump and air gage, but do not include instruments, accessories, spare parts, or tools.

The bids for the airplane hangars will be received up to May 8. These hangars are located at the Aviation General Supply Depot, Morrison, Va. The lot consists of twenty Alban-Richards Type B portable hangars, complete with canvas covering; forty-nine Alban-Richards Type A portable hangars, minus canvas covering.

Observations at the Leipzig Fair

Rapid Growth of German Machine Tool Industry—Present Design Based on Imitation, Rather Than Originality—Foreign Influence Missed

By OUR BERLIN CORRESPONDENT

The Leipzig Fair, at which the exhibition of machinery of every description has become a standing feature during the last two years, supplies a good picture of the activity of the German machine tool building industry. Recent developments have added considerably to the utility of fairs, which now spring up like mushrooms in all parts of Central Europe. Traveling has become expensive and cumbersome, and traveling salesmen are a species which, if not entirely extinct, has greatly diminished in numbers. Instead of the salesmen, the buyers are now traveling in search of the best purchases, and for them a general meeting place with a great number of sellers is a great convenience. Moreover, this year's Leipzig Fair takes place under a luckier star than its immediate predecessors, the sinking exchange naturally acting as a stimulant to foreign and domestic buyers. To the expectations based thereupon can doubtless be attributed the greatly increased number of exhibitors of all branches of industry, and the large number of visitors, surpassing all records of previous fairs. Buying is brisk, and although the reports launched in the newspapers are no doubt exaggerated, a very satisfactory volume of business has been transacted in domestic as well as foreign orders, although the hopes in the latter respect have not been nearly realized. Even at the machine tool exhibition, where in the preceding years hardly any actual contracts were concluded, a considerable number of sales have been transacted. Several exhibitors put signs on their machines indicating the number of orders received for that particular tool.

Machine Tools Predominate

The so-called technical exhibition, taking place on the exhibition grounds, which will be remembered by the members of the A.S.M.E. who visited Leipzig in 1912 as guests of the Society of German Engineers, now unites nearly all lines of engineering. The largest and most prominent space is occupied by the German machine tool industry, which exhibits collectively. The organizer, the Association of German Machine Tool Builders, is using all its influence in producing an imposing show. This year's result, evidently helped a good deal by the favorable market conditions, far surpasses all previous exhibitions. The space contracted for by the association was insufficient to house all exhibitors, and a large building had to be erected in haste. Even so, some of the exhibitors are found outside of the exhibition grounds, in the town proper.

The interest of the observer is naturally attracted to such new firms from whom novel designs can reasonably be expected. Most of these new firms originated from dealers taking a hand in manufacturing by entering into joint business with machine builders on the lookout for specialties, contracting with them for the manufacture of certain designs. In the same way a number of employees of machine tool companies in leading positions have contributed to the increase of machine tool manufacturers. Considering these facts, the exhibits of the new machine tool builders are very disappointing. Hardly without exception, they have not ventured from the beaten track. The lines adopted seem to have been selected, not with a view to satisfying a pressing demand, but rather from personal preference for certain designs and types. Independent inventive ideas, carried out with assuredness, are peculiarly absent. It is true, only a few started upon the already overcrowded field of standard machinery, but most of them encroached upon preserves already occupied by somebody else, with the sole justification of a few new and often needless improvements. The best that can be said for a number of so-called novelties is that their originators have studied the AMERICAN MACHINIST with great care and intelligence, patching together features picked out here or there. The copying of American designs from live machinery is now impossible owing to the absence of the latter, but new ideas developed in America are very useful as a guide and stimulant to the designers. As far as actual copying can be observed, it is based upon the types available from pre-war times, into which the designer has often incorporated his own ideas of improvement.

Lathes Most Prominent

Lathes form by far the most numerous group. The typical German gap lathe with flat bed did not put in an appearance. This type is slowly dying out, and where it is still made the makers seem to be ashamed to show it in public. It is now the ambition of every lathe manufacturer to produce lathes with V-ways, lead screw and feed rod, and change gear box. There is a strong tendency towards the single-pulley drive, not so much from actual demand but for gaining distinction. The ambition of the makers seems to end there frequently, although this does not apply to the leading manufacturers. The craze for all-geared headstocks is shown on a backing off lathe with single-pulley drive exhibited by Schütthoff & Baessler, one of the new firms, which is successfully combating the monopoly Reineckers have enjoyed for a long time in the making of backing-off lathes. Lathes with electric drive are also receiving increased attention. Several manufacturers show more or less happy solutions of this problem. In most cases the electric motor is placed on top of the headstock, the whole design bearing a rather makeshift appearance. In only one case can it be said that the problem has been attacked with the serious intent to produce a homogeneous design. This is the high-speed lathe made by Gebr-Boehringer, now probably the leading German lathe manufacturer. In this lathe the electric motor is put into the headstock casing, its axis in alignment with the spindle. So well have the designers utilized the space that the headstock is not much larger than in an ordinary all-geared lathe, and casual observers would probably pass it over as such a one. Headstock and motor form one compact unit. The latter is a reversible, variable speed motor for continuous current. Three speeds can be obtained through the gear box, giving in combination with the speeds of the motor a wide range of speed changes. As a further novelty in this lathe both lead screw and line shaft are driven through the gear box. The wiring for the motor is placed inside of the frame with the starter arranged in the cabinet foot under the headstock. When in position the power is carried to the lathe through cables in slots of the floor. The lathe is built in one size of 250 mm. height of centers, but in various lengths of bed. Gebr-Boehringer also show a heavy lathe on which tests are being made during the exhibition with stellite and Le Moyne steel in comparison with German makes. The stellite, which is now being sold in Germany through the Jaegerstahl Company, is still considered superior to all other makes where high cutting speeds are concerned, while the Le Moyne steel gave an excellent demonstration of its capacity in taking large feeds. Chips of 3½ mm. thickness and over 25.4 mm. wide, were cut from a piece of Siemens-Martins steel of 60 kg. strength, a record achievement of this lathe. Tests could not be carried out to the utmost limit of capacity, as the power supplied by the electric installation was not sufficient.

In the field of milling and drilling machines nothing essentially new is to be seen. The Wanderer Works, Germany's leading milling machine manufacturer, has evidently contented itself with improving the finish and workmanship rather than the design. It is now using hardened steel gears in the gear boxes. A milling machine with a double arm support of the spindle, a copy of the Milwaukee design, is shown. Ludwig Loewe shows a universal milling machine with a triple dividing head in combination with an automatic indexing device. In this exhibit a keyway milling machine is also to be seen; in this machine the cutter, at the end of its stroke, reverses automatically and repeats the stroke for cleaning out the cut, after which it is stopped automatically.

Electrically Driven Drills

A great variety of drilling machinery is shown, none of which presents any novelty. In several cases the machines are equipped with electric drive. Of gear cutting machinery very little is in evidence. Besides the well-known makes of hobbing machines, German copies of the Fellows gear shaper and the Gleason are most conspicuous. The Reinecker line of Bilgram machines is

absent. The Lorenz Machine Tool Works, which specializes in heavy gear cutting machinery, is showing a large machine for cutting herringbone pinions such as are used for turbine drive.

Of planers only a few makes are represented. A large planer is exhibited by Gebr-Boehringer, with greatly improved electric drive, for which the A.E.G. (General Electric Company) is responsible. By using an entirely novel arrangement of rheostats, the stoppage of the platen at the end of the stroke, or at any desired moment, by pressing a button, takes place with such precision that the most accurate work up to a shoulder can be performed. The novelty in this design is the automatic electric brake which comes into action before the return of each stroke, no matter whether the latter is actuated by dogs or by electric push buttons. The manner in which the brake acts varies according to the speed or length of stroke. In short strokes it is only small, and increases in proportion to the length of the stroke. The result obtained is astonishing; the reverse is entirely free of shock, even of the slightest vibration. The cutting speed can be varied between 5 and 12 in. There is a set of three buttons for starting, stopping, and reversing the platen, arranged at either side of the housing.

The Zimmerman Works, a German firm which during the last year has moved into the front rank of machine tool manufacturers, is showing a planer with a new device for the positive relief of the tool by means of a shaft placed in the toolslide and actuated at the end of each stroke through cams.

Automatics Prominent

In automatics several makes of the Gridley design are again prominent. The Pittler Works is showing an automatic of this type of unusually large dimensions, the spindle having 6-in. bore. As a novel feature of this automatic the cutting-off tool is placed vertically above the work. This firm has just published its balance sheet of last year's business, which supplies a striking instance of the prosperity which many of the German machine tool factories enjoy. The value of the buildings has been entered at less than two million marks, which now would hardly pay for the roof. The stocks of finished machinery and material, finished and semi-finished parts, figured at one and a half million marks, or hardly more than the price of the machinery visible at the exhibition.

From the commercial point of view the small automatics have been most successful. Of the many types of machines which Loewe has on exhibition, the small automatic of ¼-in. bore, which commends itself by its simple design, found largest interest amongst actual buyers. Ludwig Loewe has now re-established its foreign selling organization, and has appointed agents in all countries where it was represented before the war, including England.

A large number of makes of grinding machinery are represented, many by new firms. The only new item of interest in this field is the "Sun and Planet" system of crankpin grinding, shown by Friedrich Schmaltz. The grinding wheel, which is driven by electric motor, the two forming a compact unit, has besides its own rotation, a revolving movement around the work.

The number of single purpose machines to be seen is comparatively small. To the copy of the Lapointe broaching machine already existing, Alfred H. Schütte has added another. The Lapointe design is scrupulously followed, with only a few variations, especially in the arrangement of the driving parts. This firm is also showing a lathe for simultaneously turning, cutting-off and boring. This tool is made by the Schaerer Machine Tool Works, a lathe factory which Alfred H. Schütte bought some time ago. The machine works from bars fed through the spindle hole. It has two toolslides, one on either side, for the turning and the cutting-off tools respectively. The purpose of the machine is to manufacture rings in quantities. By the turning tool or tools the cross-section of the blank is divided into two or more rings, the center bore is performed by the boring spindle which runs in the tailstock and has a separate drive counterwise to the headstock spindle. It appears that Schütte is constantly expanding his manufacturing scope. In his double capacity of manufacturer and dealer the first seems now to be predominant, at least inside of Germany. The firm has re-established most of its pre-war time foreign branches and agencies.

In the small tools section little of interest is seen. The most prominent part of this section is occupied by Schuchardt & Schütte's exhibit of the precision measuring tools developed in connection with the well-known optical works of Carl Zeiss. While the machine tools this firm shows deserve no special mention, being designed on strictly conventional lines, the precision measuring tools represent, no doubt, the greatest progress achieved in Germany during recent years. The standard types of gages, of which various kinds are shown, are noteworthy only as specimens of the high-class work done in the Zeiss factory. However, in the combination of mechanical and optical measuring some great results have been accomplished. These optimeters, as they are called, are capable of correctly reading measurements down to 1/1000 part of a millimeter. Of special interest is the thread measuring optimeter, which is the most perfect and best of its kind known in Germany. The Zeiss instruments will probably be introduced in America as soon as their manufacture in quantities is assured.

Firms Expanding

Schuchardt & Schütte have been able to develop their organization and have increased their manufacturing lines. The latter consist of cutting tools and gages, several standard machines and a few single purpose tools. Another specialty of the firm is the manufacture of portable electric drills. The firm maintains its old established branches in Stockholm, Copenhagen, Vienna, Prague and Budapest. The branch in Milan was re-eopened on a larger scale than in pre-war times, and a sales office was established in Amsterdam a short time ago.

The Fortuna Works, manufacturer of the Hirth minimeter, has added a new feature to this instrument, which increases its value in shop practice. Two small electric lamps, a red and white one, are placed close to the reading dial. They are connected with the index finger, and can be adjusted to light up at required limits. Instead of lamps, electric bells of different sounds may be used so that the instrument can be handled by blind war invalids. The firm has received numerous inquiries for minimeters from America, but find the way to this market barred. The firm placed its agency in America with a New York firm. The shipments sent to this firm have been refused entry into American territory because of an injunction obtained by the former agent, the Norma Company of America. This injunction has of course been granted on the strength of the patent rights having passed into the possession of the American Norma Company, but the impression created in Germany is that German firms have no legal standing in the United States, although nearly four years have elapsed since the end of the war. For this reason they are shy in licensing new inventions to America, and many promising negotiations in this respect have broken down on such grounds.

A Thousand Designs

There are over two hundred machine tool makers represented at the exhibition, and more than a thousand tools of various makes and designs can be counted. With the few exceptions mentioned, none present any material news interest. Specialization has not advanced any further. On the contrary, it seems that works which have thrown overboard some of their lines, evidently with a heavy heart, are now branching out again. Specialization seems to be content to remain a doctrine only. Even young firms, starting out with single-purpose machines, show an inclination to take up other lines as they go along. The old German adage that one cannot stand on one leg is evidently being followed, disclosing a certain lack of confidence of the manufacturers in their designs. German firms maintain that their market is not large enough for such minute specialization as prevails in America, but as the production of the German machine tool industry is not far behind the American, such arguments are not convincing. The truth is that the makers instinctively incline to make the nets in which to catch the buyers as large and closely meshed as possible. Standardization of parts is also progressing very slowly. Manufacturers of measuring tools state that although new firms are frequently ordering their gages according to present standards, the old established firms are exhibiting strong conservatism, opposed to any change.

The general impression received from the exhibition is that only a few of the manufacturers are keeping in mind the building up of their production with a view to future business, and that most of them are solely thinking of the business of the present. In the latter respect good results are evidently obtained, and prosperity seems to prevail almost everywhere. The ill effects of the long seclusion from the outside world upon the moving spirit of the industry are strongly visible. New blood is urgently needed, and no greater service could probably be done to the German machine tool industry than if conditions would permit the importation of foreign machinery. As it is, a marked staleness prevails, which can be remedied only by foreign competition.

Growth of American Machinery Trade in China

BY A BRITISH CORRESPONDENT

One of the great outstanding features about China's trade today, is the steady rise of American commercial influence in that country. This is evidenced by the fact that the value of United States' exports to China has risen from 25 millions of dollars before the war, to about 150 millions of dollars last year. That, in itself, is a significant fact; and before dealing with the machinery and machine tool trade, I propose examining very briefly the causes of this increase. In 1914, there were only 136 United States commercial houses in China. Today there are considerably over 400. There are many causes operating to cause a favorable environment to American enterprise. Of course, the events of the war had some influence. The United States enjoyed peculiar advantages in that part of the world during the war, some time after hostilities ended, particularly in regard to early delivery of machinery. For some years English exporters of machinery could not deliver on any terms, and when the war ended they could do so only on terms that made business very difficult. Some of these advantages have passed and others are passing away and competition in future will be on more equal terms.

This large development of American trade in the Celestial Empire is recognized by all shrewd observers in Europe as a sure sign of her growing realization of the importance of the Pacific. British manufacturers realize that in future America will be a far more serious competitor than in the past. Several influences have been at work in promoting United States trade, influences which English traders often pooh-poohed and regarded as of little importance, but when taken in the aggregate are of great value. For instance, for years past Americans in China have been working very hard in educating the Chinese, building and endowing many schools and colleges; mixing in a spirit of real comradeship with the better class of Chinese in social functions; while their sympathy with the ideas and aspirations of "young China" has brought them into close association with the more progressive elements in the country. All these influences are factors and have had a certain cumulative effect. The influence, too, of American missionaries, working in a perfectly legitimate way, must not be ignored. It is undeniable that the United States business element in China has got much nearer to the hearts of the people than the representatives of most other countries, although, of course, all this would have been useless unless the American merchant had had a good article to sell.

A Closer Friendship

The "new ways" represented by American firms in China appeal also to the younger and more democratic Chinese merchants. The new spirit has become noticeable among Chambers of Commerce where the old-time conservative element has had to recognize the power of the younger men with their more go-ahead methods. This element is inclined to ignore the old traditions and methods of trade and to follow the system that offers more chances even if at the risk of occasional loss. This bolder spurt of enterprise has brought the two races much closer together than people in Europe can imagine.

A little while ago, the Hong Kong correspondent of the *Times* quoted some local selling prices of machine tools, etc., in South China. It should be pointed out that to the Chinese mind price is the chief consideration. Many buyers of engineering products are unable to distinguish between a very good article and one that may have a good appearance, but yet be a poor article. Only a comparatively few of them are able to judge the merits of design or construction. They will buy a very cheap tool in the hope that it may be a good one and that if not then it is only the loss of a few hundred dollars. This strikes the Western mind as rather a speculative way of doing business, but it is the Chinese method in many cases.

The local selling price of an English made screw-cutting 6-in. lathe is about £267, while the price of the foreign-made machine is quoted at about £130. Local quotations for an 8-in. British lathe is in the neighborhood of £400, while the foreign-made machine is sold at £230. The British 10-in. lathe is quoted locally at £537 against its competitors' price of £325. It is not suggested here for a moment that these machines are of equal value. An experienced eye at once notices the difference in design, construction and wearing efficiency. But as already stated, the majority of Chinese buyers in the engineering section cannot be regarded as at all competent judges as to the respective merits of competing machines. All they know is that there is a very large difference in price and they are largely blind to quality. The prices of American-made machine tools are reported by Chinese firms to be rather lower than those quoted for British machine tools.

A shaping and planing machine giving a 10-in. length of stroke (hand power) is quoted at £20. A British shaping machine (stroke to 12-in.) costs £200 in China, whereas a foreign firm is selling a 10-in. machine (not hand power) at £50, and a 16-in. machine at £106. In 1920 the latter machine was quoted at £126. British 16- to 18-in. machines are quoted locally at £250, against a 22-in. machine for £150 by foreign importers, the 18-in. machine being, £120. A British planing machine 6 ft. x 30 in. x 30 in. costs locally £625; a machine of similar dimensions imported from another part of Europe cost £370. A British 25-in. drilling machine costs locally £215, while its foreign-made competitor, a 24-in. drill, costs £68, and this is seen to be typical of drilling machines of all sizes and types.

The prices speak for themselves. It is felt by everyone handling British machinery and machine-tools in the Chinese market that unless very substantial reductions are made in price it will be well nigh impossible to compete in the open market against American and Japanese competition.

To illustrate further the seriousness of the present condition of affairs, I need only recall the instance of the contracts for supplying railroad material to certain lines in China six months ago. The value of the contracts was half a million pounds sterling for the supply of locomotives and wagons. There were 176 tenders from British, French, American, German, Japanese, Chinese and Belgian makers. As will be seen below the British prices were not even in the running, the Belgians carrying off all the business except for five engines of special U. S. A. manufacture.

Goods Required	Successful Manufacturers	Price	Lowest and Highest British Tender
30 Prairie Type Locomotives	Forges Usines et Foundries of Haine St. Pierre	£10,000 (approx.)	£13,075 to £18,732
6 English Type Locomotives	Forges Usines et Foundries of Haine St. Pierre	£10,050 (approx.)	£13,500 to £17,280
2 Mikado Type Locomotives	American Locomotive Co.	£12,500 $52,000	£14,904 to £17,000
3 Pacific Type Locomotives	American Locomotive Co.	£12,500 $52,000	£14,310 to £16,500
100 Steel Open Wagons	Compagne Central de Construction a Haine St. Pierre	£680 (approx.)	£1,016 to £1,340
100 Steel Covered Wagons	Compagne Central de Construction a Haine St. Pierre	£738 (approx.)	£1,160 to £1,470
40 Steel Covered Wagons	Compagne Central de Construction a Haine St. Pierre	£738 (approx.)	£1,160 to £1,510

In this case, little, if any, financial aid would have been required because the goods would be paid for within six months. The whole contract turned on the question of manufacturing costs, which were then and are still to a rather less degree, so high in the United Kingdom that British firms had absolutely no chance of competition with those of foreign nationalities. Failing the Belgian success, the work would have gone to America or to Germany. On some of the items in the table the highest among the British tenders were nearly double those of the Belgians.

The newly issued government report on China deals with this very question of contracting for railroad rolling stock and the general conditions relating thereto. It is pointed out that the conditions on which such orders are obtainable generally involve extended terms of credit, payment usually being spread over three or even five years and that this condition does not commend such business to English manufacturers, the report adds these words:

"It is evident, however, that so long as the Chinese railroads can find merchants or manufacturers of other countries willing to do business on these terms the market offers few opportunities to those who pursue a more conservative policy." Later on reference is made to offers said to have been made by American firms to allow payments for locomotives over a period of seven years. "It is obvious (it says) that no British manufacturer or mer-

chant house could afford to grant such liberal terms without some strong financial backing, and the question arises whether the time has not come to consider the establishment of an Anglo-Chinese Industrial Bank which would assist our manufacturers in financing large contracts involving deferred payments."

STATEMENT SHOWING THE EXPORTS OF MACHINERY FROM THE UNITED STATES TO CHINA DURING THE YEAR ENDING JUNE 30, 1914, AND THE CALENDAR YEAR 1920

Machinery, Machines and Parts Thereof	1914 Dollars	1920 Dollars
Adding and calculating machines	1,598	42,277
Air compressing machinery	7,859	53,230
Brewer's machinery	.....	19,050
Cash registers and parts	3,795	19,410
Concrete mixers	N.s.d.	42,111
Cotton gins	368	20,445
Cream separators	411	2,898
Elevators and elevator mach'y	10,340	28,102
Electric locomotives and parts	.....	90,150
Internal combustion engines:		
Stationary, gas and parts	2,914	20,594
Automobile gasoline parts	.....	1,675
Marine gasoline parts	19,330	60,867
Stationary gasoline parts	11,404	135,674
Traction gasoline parts	.....	29,814
Kerosene (traction)	N.s.d.	9,512
All other	N.s.d.	31,317
Steam locomotives and parts	328,629	3,370,510
Steam marine engines and parts	.....	56,636
Steam engines, stationary and parts	136,307	364,731
Steam engines, traction and parts	.....	.....
All other engines	4,662	158,837
Engine parts, not elsewhere specified:		
Boilers		345,950
Boiler tubes	40,771	167,211
Other parts		1,106,001
Laundry machinery: Power machines	1,420	18,644
All other	408	4,006
Lawn mowers	224	1,212
Metal working machinery:		
Lathes		241,433
Other machine tools	17,668	413,039
Sharpening and grinding		55,317
All other		222,562
Meters, gas and water	N.s.d.	11,907
Milling machinery—flour and grist	132,635	539,032
Mining machinery— oil well	.....	32,505
All other	4,004	40,966
Paper milling machinery	3,292	48,418
Printing presses	5,192	324,016
Pumps and pumping machinery	14,333	445,026
Refrigerating machines	584	93,421
Road making machinery	N.s.d.	15,135
Sewing machines	28,055	768,931
Shoe machinery	.....	2,679
Sugar milling machinery	.....	28,079
Textile machinery	3,149	3,798,673
Typesetting machines, linotype and other	562	12,503
Windmills	609	1,694
Typewriting machines	46,822	246,611
Woodworking machinery:		
Sawmill machinery	305	27,663
All other	975	71,388
All other machinery and parts	175,266	3,163,728

Note: N.s.d. Not separately distinguished.

The Trend of Business Improvement—Plants Resuming

The Western Electric Co., Hawthorne, Ill., has adopted a production schedule calling for 900,000 complete telephone instruments during the present year, in addition to 9,000 switchboard sections and other electrical equipment.

The Grand Trunk Railroad Co. has resumed operations at its repair shops at Battle Creek, Mich., following a few weeks' shut down. A force of 550 men will be employed.

The Carnegie Steel Co., Pittsburgh, Pa., has resumed operations at the 10-in. rolling mill at its Mingo Junction, Ohio, plant, following a shut down of about a year. The mill will give employment to about 100 men.

Thomas A. Edison, Inc., West Orange, N. J., is resuming production on an increased capacity basis in all departments at its local plant, with greatest advance in the storage battery branch of the business. Employment is being given to about 3,000 operatives, and this working force will be increased by about 100 employees a month.

The Wilson Foundry and Machine Co., Pontiac, Mich., a subsidiary of the Willys-Overland Co., Toledo, Ohio, has increased production from 50 to 100 Knight motors per day, and during the present month plans to advance the output to 125 motors per day, reaching full capacity. The company is now giving employment to about 1,500 men at the plant.

The Norfolk & Western Railway Co. is developing capacity operations at its machine and repair shops at Shenandoah, Va., and a large number of men are being added to the working force.

The Baldwin Locomotive Works, Philadelphia, Pa., has contracted for locomotives to an amount of more than $1,000,000 during the past fortnight, including twenty-five engines for the Chicago, Milwaukee & St. Paul Railroad Co., and three locomotives for the Alabama & Vicksburg Railroad Co. The company now has unfilled orders on hand totaling in excess of $10,000,000.

The American Car and Foundry Co. has received a contract from the Norfolk & Western Railway Co., for 1,000 steel hopper cars, and will handle the work at its Berwick, Pa., plant. The working force is gradually being increased, and it is expected that a quota of 3,500 men will be on the payroll early in May.

The Bethlehem Shipbuilding Corporation, Wilmington, Del., will soon add 100 additional men to the working force in the car shops at its local Harlan works, making a total of 700 men in this department. The company has contracted for 140 all-steel cars for different railroads, in addition to an order for 250 such cars for the Pennsylvania lines.

The General Electric Co. is increasing the working schedule at its Pittsfield, Mass., plant, and taking on a number of new employees. Operations have been increased more than 20 per cent since the first of the year.

The Davies & Thomas Co., Catasauqua, Pa., manufacturer of iron and steel castings, will resume operations at once on a full capacity basis, following the securing of a contract from Booth & Flinn, Inc., New York, contractor for the New York-New Jersey vehicular tunnel under the Hudson River, for 48,000 tons of cast-iron segments, to be used in connection with the project. The company is making inquiries for 50,000 tons of pig iron to be used for the work.

The Dort Motor Car Co., Flint, Mich., is increasing production at its plant and rapidly reaching capacity output. Manufacture of completed cars during March was 229 per cent in excess of production in February, while the figures for the last noted month were 150 per cent over those of January.

The American Steel and Wire Co., Allentown, Pa., has adopted a capacity schedule at its local plant, increasing operations from two to three shifts a day, giving employment to more than 1,000 men. Orders on hand insure this basis of output for an indefinite period.

The axle plant of the Olds Motor Works, division of the General Motors Corporation, Lansing, Mich., has adopted a full time operating schedule, giving employment to close to 1,400 men. The plant will produce 15,000 sets of axles for the Oakland Motor Car division of the corporation, on a basis of 125 sets a day. In addition the plant will produce 90 sets a day for the Oldsmobile car, making a total output of 215 sets of axles daily. It is planned to increase the present working force by about 100 men within the next few weeks.

The Ford Motor Car Co., Detroit, Mich., is operating its Canadian plant on a production basis of 4,000 automobiles a month. The Manchester, Eng., plant of the company is running on a production schedule of 2,000 cars a month, while the Buenos Aires, Argentina, works are producing on an average of 1,250 cars and trucks monthly.

The Chevrolet Motor Co., Bay City, Mich., is running on a daily production schedule of 800 motors and 900 axles in these departments, at its local plant.

The Birdsboro Steel Foundry and Machine Co., Birdsboro, Pa., has adopted an increased operating schedule at its plant. An order for car bolsters has been received from the Philadelphia & Reading Railroad.

The Vulcanite Roofing Co., Anderson, Ind., manufacturers of composition roofing products, is increasing operations at its local plant, and has added 80 employees to the working force during the past fortnight.

The Philadelphia & Reading Railroad Co. has placed orders with the Bethlehem Steel Co., Bethlehem, Pa., for 10,000 tons of 100-pound rails, and 3,000 tons of 130-pound rails; and with the Carnegie Steel Co., Pittsburgh, Pa., and the Midvale Steel Co., Philadelphia, Pa., for 5,000 and 2,000 tons, respectively, of 130-pound rails.

The Crescent Washing Machine Co., New Rochelle, N. Y., has been running at practically normal for some time and finds business conditions improving. The production at the present time, which is chiefly of dish-washing machines, is stated to be 80 per cent of the maximum production that the company has ever had.

The Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has received orders for five large booster converters with transformer equipment. The orders aggregate about $250,000 and will take six months to complete.

The Van Norman Machine Tool Co., Springfield, Mass., is increasing its output of its new grinding machine, the Re-li-o, and has developed a new machine, embodying the same general ideas, but suited to wet grinding, which is now being put in production.

New York Central Railroad has ordered 19,000 freight cars from the Standard Steel Car, American Car and Foundry, Pressed Steel, Pullman, General American Tank Car Co. and Rolston Steel Car Co.

During the month of March this year the National Cash Register Co., of Dayton, Ohio, did four times as much business as compared with the same month last year.

Cincinnati Letter

Machine tool builders in this city report that they are receiving few orders from widely scattered sources, which seems to indicate that business is picking up in this line, but is still far from normal. Dealers in used equipment report increased sales, and in some instances have been unable to supply the machines wanted. One purchasing agent who wanted a certain kind of lathe, found two dealers who could supply this machine, but before he had made up his mind which one to purchase from, both machines were sold to out-of-town customers. This is mentioned as an instance of how sales are being made today.

Several machine tool manufacturers are doing work for builders of radio apparatus. The Crossley Manufacturing Co., manufacturer of radio outfits, has taken over the plant of the Greaves-Klusman Tool Co., and will employ about 300 men in this growing industry. The plant will be operated by the American Automobile Accessories Co., which is a subsidiary of the Crossley concern. The main factory of the Crossley company will continue at Northside.

A great many of the machine tool men in Cincinnati will attend the meeting of the National Machine Tool Builders' Association in Atlantic City, N. J., on April 25 and 26.

James C. Smith has resigned from the Eastern Machinery Co., and has opened salesrooms at 6 East Third St., where he will deal in machine tools and equipment under the name of the Smith Machinery Co.

Chicago Letter

Although there are conflicting reports concerning business during the month of March, all dealers seemed to be pleased and feel that the first week in April has brightened the outlook by the increase in prospects and the amount of buying. There has not been the slightest decrease in the amount of inquiries since the first of the year.

It is understood that the John-Manville Co. has purchased part or all of the tools listed in the recent inquiry for the Waukegan plant. The report that the Universal Portland Cement Co. had purchased against its outstanding list has been denied on the grounds that the appropriation to cover the purchase of the machines has not yet been secured. One of the largest orders received by a local concern was for twenty-two nail machines.

A slight development is noted in railroad activities. The Santa Fe system has issued the following additions to its outstanding list: One No. 4 milling machine, one 40-in. turret lathe, one 24-in. lathe, flue testing machines, one Morton 36-in. shaper, four 20-in. lathes, one emery wheel stand and a boilermaker's flange clamp. The Burlington recently inquired for a 1½-in. triple head bolt cutter and a heavy-duty drill. The Illinois Central, which it is reported, recently purchased a 24-in. x 12-ft. engine lathe, has not issued any inquiries recently and the engine lathe is evidently something inquired for some time ago.

A number of shop-owners who have found their present equipment more than adequate for their needs, are disposing of many of their machines to other manufacturers at prices far below their worth, seemingly unaware of the fact that fair prices could be obtained for these machines in the regular used-machinery markets.

Business Outlook in Foreign Markets

Cable reports to the Department of Commerce show an increased activity in foreign markets. The improvement reported in February in the demand for American products continues.

The demand for machinery in the Dutch East Indies is of exceptional interest to American manufacturers, because this market was practically neglected until circumstances connected with the war brought about an increased demand for American machinery. Since that time the United States has shared to a considerable extent in this trade. In 1900 it represented a total value of over $4,000,000 per year; by 1911 it had increased to $8,000,000; in 1914 it was $10,000,000, the trade being handicapped due to the war, but in 1919 it rose to about $22,000,000.

Since Chinese import trade has recently revived and the building of business houses, roads, railways and factories has been resumed, it is interesting to know what part Germany is taking in this. The *Deutsche Handelsdienst* states that German firms are doing a large business in electrical machinery. A German company is competing with an American firm for the contract of putting in a telephone system in the principal city of Shantung. Also in Shantung a sugar refinery is to be established, which will have a working capital of £2,500,000 and which will require a complete new outfit of machinery.

A considerable amount of new government construction work which would involve the use of steel is contemplated in Quebec, Canada. During the period July 1, 1920, to June 30, 1921, fifty-eight steel bridges were built in the Province and fifty-five (thirty-two all-steel and twenty-three reinforced-concrete) are under construction.

During 1921 the United States shipped to Alaska seventy passenger cars, valued at $75,242, and fifteen motor trucks valued at $10,279. The registration of motor vehicles in Alaska shows a total of 384 passenger cars and 153 motor trucks.

Cost of Castings Over the Country

Although machinery casting work is essentially a labor proposition, requiring separate detail and an individual price on each casting, a certain uniformity in rates per pound is noticeable throughout the various important industrial centers.

Prices vary, depending upon quantity, weight of casting, and on the nature of the work. The type of pattern or the shape of a given piece of work may also materially affect the price. However, certain minimum and maximum rates apply to most castings, based upon the cost of the metal used and the difficulty of the operation.

In the accompanying table current rates are shown in twelve large cities. These prices, which represent average conditions, fluctuate but slightly from week to week, being governed by conditions in the metals market and the cost of labor, as well as by the size, weight and specific details of the job. For instance, few foundries can compete at a rate under 3c. per lb. for gray iron, regardless of the size of the casting, while a rate exceeding 16c.@20c. per lb. would seldom be charged on gray iron castings even of light weight and in small lots. Minimum and maximum rates on all types of jobs taken into consideration, it appears that in most instances a price of 5½c.@6c. per pound is fairly representative of the cost of medium weight gray iron machinery castings on the present market.

MACHINERY CASTINGS — IN CENTS PER POUND:

		Gray Iron	Steel	Brass	Bronze	Aluminum Alloy
Pittsburgh	—Light	9.0	16.0	30.0	34.0	65.0
	Medium	6.0	10.0	27.5	30.5	52.5
	Heavy	3.0	6.0	25.0	29.0	40.0
Philadelphia	—Light	9.0	14.5	14.5	15.0	25.0
	Medium	5.5	12.0	....	....	....
	Heavy	2.65	12.0	5.0	....	....
Atlanta	—Light	5.5	22.5	25.0	25.0	65.0
	Medium	4.5	20.5	22.0	22.0	60.0
	Heavy	4.0	18.5	20.0	20.0	50.0
Detroit	—Light	7.0	17.0	35.0	....	....
	Medium	4.5	12.0	30.0	....	....
	Heavy	3.0	7.0	22.0	....	....
Birmingham	—Light	16.0	....	33.0	33.0	70.0
	Medium	7.5	....	30.0	30.0	59.0
	Heavy	2.5	....	28.0	28.0	48.0
Denver	—Light	8.0	30.0	30.0	40.0	60.0
	Medium	6.0	15.0	24.0	31.0	50.0
	Heavy	5.0	7.0	19.0	27.5	40.0
New Orleans	—Light	9.0	12.0	25.0	36.0	50.0
	Medium	6.0	10.0	19.0	26.0	45.0
	Heavy	4.0	9.5	....	22.0	35.0
Minneapolis	—Light	9.0	17.0	28.0	30.0	70.0
	Medium	6.0	11.0	25.0	28.0	60.0
	Heavy	4.5	7.5	22.0	25.0	50.0
New York	—Light	9.0	22.5	30.0	34.0	65.0
	Medium	6.0	16.0	27.0	31.0	57.5
	Heavy	3.0	10.0	25.0	29.0	50.0
Cincinnati	—Light	5.0	15.0	20.0	20.0	50.0
	Medium	4.5	11.25	16.0	16.0	45.0
	Heavy	3.75	7.5	12.0	12.0	40.0
Cleveland	—Light	6.75	18.0	30.0	32.0	75.0
	Medium	4.5	13.0	25.0	27.0	60.0
	Heavy	2.6	9.0	20.0	24.0	45.0
Montreal	—Light	...	....	....	....	....
	Medium	...	....	....	....	....
	Heavy	...	....	22.0	30.0	35.0

Business Items

The Cleveland office of William K. Stamets has been moved to 974 and 976 Kirby Bldg. George D. Miller is manager of the Cleveland Office. The Stamets organization recently concluded agency arrangements with a group of Hartford manufacturers, including Billings & Spencer Co., Hanson-Whitney Machine Co., Hartford Tap and Gauge Co., Taylor & Fenn Co., and the Whitney Manufacturing Co.

Jones, MacNeal & Camp, manufacturers of "Power King" electric drills, have moved from Chicago to a new plant at Warsaw, Ind.

The Wiederboldt Construction Co., of St. Louis, Mo., has opened offices at 30 Church St., New York City. J. D. Martin is in charge. The company builds a patented chimney for smelters and steel plants.

The Western Radio Manufacturing Co., 11 South La Salle St., was recently incorporated by Sidney Saldinger, H. E. Wilmore and Charles Gollay, with a capital stock of $20,000, to manufacture and deal in radio apparatus.

The Combustion Engineering Corporation has opened a branch office at 1137 Guardian Bldg., Cleveland, Ohio. Frank Henderson has been placed in charge.

The Wright-Hibbard Electric Truck Co., of Buffalo, N. Y., has purchased the Collins Iron Co. building in Phelps, N. Y., and will convert it into a factory for the manufacture of electric industrial trucks.

The Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa., has received a contract from the Southern California Edison Co., for electrical equipment for a powerhouse at Big Creek. The aggregate consideration is said to be $1,500,000.

The Electric Furnace Co., Alliance, Ohio., has moved its general sales offices from Alliance to Salem, Ohio. All departments will be consolidated at the works on Wilson Street.

The Hibbard Manufacturing Co., Joplin, Mo., is building an addition to its plant in that city. This new building will take care of the manufacture of sludge tables, and when completed will afford employment to several machinists.

The Domex Co., of Buffalo, N. Y., manufacturers of small metal parts, has secured lease on a factory building at Akron, N. Y., and will remove from Buffalo. The Domex Co. is now negotiating for the plans and patents of the Kaman Auto Radiator Co., of Akron, and will install machinery and equipment for the manufacture of radiators and tubular specialties.

The interests of H. H. Hall in the Draper & Hall Co., Middletown, Conn., have been purchased by G. E. Quinn, who now becomes general manager of the concern. The business will be continued under the old name, expanding later into the manufacture of automatic grinding machines and twist drills.

The Garlock-Walker Machinery, Ltd., of Toronto, Canada, has been changed to the Garlock Machinery, Ltd.

The American Bosch Magneto Corporation reports, for the year ended Dec. 31, 1921, a deficit of $2,049,992, after an inventory adjustment of $1,813,815. After deducting dividends of $120,000, there was a deficit for the year of $2,169,992. That result compares with a net income of $945,700 in 1920.

Announcement has been made in Baltimore that the Richmond, Va., plant of the Chicago Nipple Manufacturing Co. has acquired a plant in Baltimore and will move to that city. It is expected that the new plant will be ready for operation in May.

The Andrews Iron and Steel Corporation recently started operations in its new plant at Utica, N. Y. The company has remodelled the plant formerly occupied by the pipe foundry of the International Heater Co., and with new machinery will manufacture structural steel and bridge shapes. Officials of the company are: President and general manager, George W. Andrews; vice-president, O. J. McKeown; treasurer, F. J. McMackin; secretary, C. A. Schmidt.

The Universal Tool Co. has been organized at Garwood, N. J., with a capital stock of $125,000. Directors are W. H. Osborne, Jr., D. B. Smith and Blair Reily, of Newark, N. J.

The locomotive department of the Beech Grove, Ind., shops of the Big Four Railway Company, which has been closed since Feb. 15, was reopened under the contract plan by the Railway Service and Supply Corporation, which is also operating three other departments in the shops. E. S. Pearce, general manager for the contracting corporation, said the success with which his corporation had operated the three other departments in the shops had been responsible in a measure for the decision of the Big Four Railway officials to adopt the contract plan for the locomotive department and he said it was gratifying to know that the men themselves preferred it to the old system of dealing direct with the railroad company because they could earn more money.

Personals

JAMES L. O'NEILL, formerly inspector in charge of tools and gages at Frankfort Arsenal, is now with the Budd Wheel Corporation, Philadelphia, Pa.

GUY CUNNINGHAM has been appointed receiver of the Rivett Lathe and Grinder Co., of Boston, Mass.

PATRICK J. FOY has resigned his position as safety engineer at the Willys-Morrow plant at Elmira, N. Y., and will engage in private business.

M. W. TABER is now special representative for the Motor Wheel Corporation of Lansing, Mich., with offices in Detroit.

CHARLES E. FOUHY, of Boston, Mass., has been secured by the Willys-Morrow Co. to head the employment bureau at the Elmira plant.

R. P. RAYMOND, formerly chief draftsman for the Columbia Graphaphone Manufacturing Co., of Bridgeport, Conn., has been appointed superintendent of manufacture for that company in the plant at Toronto, Canada.

PROF. SIMON T. HART, of the College of Applied Science, Syracuse University, Syracuse, N. Y., addressed the Technology Club of Syracuse at a recent meeting. His subject was "Cams, their Design, Construction and Uses."

RICHARD G. PLUMLEY has been appointed manager of the order department of the Yale & Towne Manufacturing Co., Stamford, Conn. He will be assisted in this position by George L. Hodges.

WILLIAM H. WOODLIN, president of the American Car and Foundry Co., sailed last week for Rome, where he will attend the International Railroad Congress to be held in that city on April 15.

GINJIRO FUJIHARA, president of the Oji Paper Manufacturing Co., of Tokyo, Japan, with his purchasing manager, Yasunosuke Fukukita, and three departmental heads who are touring United States and Canada, investigating paper-making machinery and mechanical equipment, recently spent some time at the plant of Bagley & Sewall Co., in Watertown, N. Y.

NORMAN L. SNOW has resigned his position as vice-president and active head of the Terry Steam Turbine Co. of Hartford, Conn., to become president and treasurer of the Diamond Power Specialty Corporation, of Detroit, Mich., a new company which has purchased the business and plant of the Diamond Power Specialty Co.

F. S. HICKLING has been appointed manager of the railway division of the Westinghouse Electric and Manufacturing Co., Pittsburgh office. Barton Stevenson is now in charge of the power division and S. R. Shave of the price section.

WILLIAM E. DOUGHERTY has joined the sales force of the Independent Pneumatic Tool Co., of Chicago. Mr. Dougherty will make his headquarters at the Philadelphia office.

G. F. SHERRATT has been appointed manager of the Pittsburgh office of the Chain Belt Co., of Milwaukee. The Ward Equipment Co., of Pittsburgh, will continue to handle the complete line of "Rex" products, made by the Chain Belt Co.

GEORGE S. BARTON, president and treasurer of the Rice, Barton & Fales Machine and Iron Co., Worcester, Mass., paper and pulp machinery manufacturers, will leave on a business trip to Europe about the middle of April.

L. D. MOWERY has been appointed general manager in charge of production of the Mills Company, Cleveland, Ohio. Mr. Mowery has been a designer and manufacturer of steel factory equipment for more than twenty years, and was the founder of the Metal Crafts Company. More recently he was consulting engineer for the E. F. Hauserman Co., Cleveland. The Mills Company produces steel shelving, sash, skylight frames, partitions, cabinets, tables and the like.

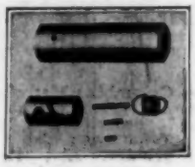
Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Oiler, Cone-Pulley, "Flush"

Sexton Machine Co., 308 Pearl St., Hartford, Conn

"American Machinist," December 15, 1921.

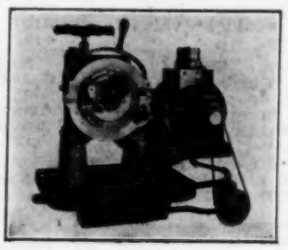


The oiler is adapted for use in cone pulleys especially, but also for pulleys running on shafts or studs. The body of the oiler is a steel tube of sufficient length to reach from the surface of the pulley to the bore, and is ground on the outside diameter to a drive fit in a standard reamed hole. When filled with oil the plug is snapped back to place, flush with the surface of the pulley, preventing the escape of oil. The tube and hollow body of the plug constitute the reservoir. The oiler is made in ¼, ⅜, ½ and ⅝ in. sizes, and with any length of tube desired.

Threading and Cutting Machine, Pipe, Motor-Driven, Forbes, No. 4oo

Curtis & Curtis Co., Railroad Ave. and Garden St., Bridgeport, Conn.

"American Machinist," December 22, 1921.



The head of the machine is mounted in a supporting shell, is rotated by a direct-connected electric motor and has an automatic release and cam lock. Longitudinal travel is provided for the head, to feed the dies on the pipe. An automatic feed is provided for the cut-off device. The machine is intended for mounting on a bench, but can be equipped with a floor stand and a high adjustable pipe rest. Three sets of dies each are furnished with the machine, as well as three cut-off tools. The machine has a range of ⅛ to 2-in. right-hand threads, and requires a 1-hp. motor running at a speed of 1,800 r.p.m. Height, 20 in. Bench space, 24 x 16 in. Weight, 350 lb.

Grinding and Sanding Machine, Spindle-type, "Little Wonder"

Wonder Grinder Co., 612 West 12th Street, Erie, Pa.

"American Machinist," December 22, 1921.

The machine is intended for internal circular grinding on both wood and metal. The table is circular, and can be tilted 45 deg. to either side. It automatically locks at right-angles to the spindle, or may be locked in any desired position. The abrasive spindle is mounted on a vertical shaft, and driven directly from a ½-hp. removable electric motor mounted vertically in the base. The spindle has an adjustable top bearing and runs at a speed of 1,725 r.p.m. It is 9 in. in length and is provided in diameters of 1½, 2¾ and 4½ in. with an oscillation of ¾ in. The motor can be furnished for direct or alternating current of 25, 40 or 60 cycles. The controlling switch is on the front of the column. Table, 20½ in. in diameter. Height, 37 in.

Stand, Garage, "Champion"

Western Tool and Manufacturing Co., Springfield, Ohio.

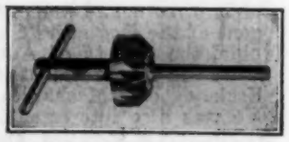
"American Machinist," December 22, 1921.

The stand is made of steel throughout, the trays being of pressed steel and the supporting frame of heavy pipe. A plain-jaw "Champion" vise No. 13 is mounted on the table. A drawer is provided for tools. A brake can be easily operated by the lever underneath the vise, and when locked it prevents movement of two of the casters. Height, 39 in. Length: top shelf, 42 in.; middle and bottom shelf, 43 in. Width: top shelf, 14 in.; middle and bottom shelf, 26 in. Drawer, 14 x 14 x 4½ in.

Valve Reseating Tool, Automotive

New Britain Tool and Manufacturing Co., New Britain, Conn.

"American Machinist," December 15, 1921.

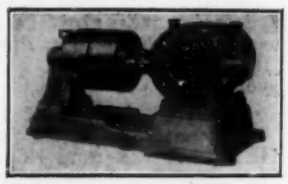


In this tool for resurfacing the valve seats of automobile engines, the cutter is made like a shell reamer and is a slip fit for the shank, upon which it is held against turning by a short spline or pin fitting into a notch in the shell. It is of high-carbon steel and may be furnished in any required angle, though it is stocked in angles of 30 and 45 deg. The pilot portion of the shank is furnished in any diameter to fit standard sizes of valve-stem guides, or it can be made to fit oversizes. Cutters and shanks are interchangeable, so that any combination may be quickly secured.

Pump, Rotary

Exeter Machine Works, Inc., West Pittston, Pa.

"American Machinist," December 22, 1921.

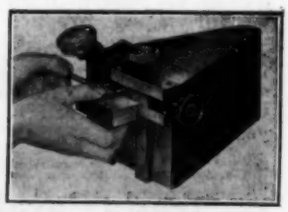


This pump handles liquid of any specific gravity and is adaptable to machine shop use for circulating lubricating oil and coolant. The inner rotor is keyed to the driving shaft. The outer rotor has four ports which open into the chambers of both the suction and the discharge side of the pump during rotation. The pump has no reciprocating parts, operates at comparatively slow speed and delivers a continuous flow of liquid. It is stated that under normal barometric conditions it gives 28 in. of vacuum. Small pumps tested are said to have shown a volumetric efficiency of 98.67 per cent, and a pumping efficiency between 70 and 82 per cent. The pump can be furnished with the body strengthened to operate against a pressure of 600 lb. per square inch.

Gage, Thread-Lead

Toledo Tap and Die Co., Clinton St., Toledo, Ohio.

"American Machinist," December 22, 1921.

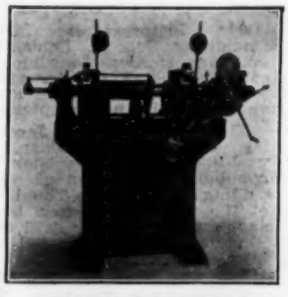


The device gages the lead of threads and was originally developed to check the lead on the taps and precision studs made by the concern. The gage consists of an arm 8 in. long pivoted on an adjustable bearing. A hardened and ground point engages the thread tested, and is connected with the dial gage to register the accuracy of the work. One of the measuring points is movable, and can be set within a range of from ½ to 2 in. An elevating table holds work up to 2 in. in diameter. The adjustable point is set to the zero position from a master thread gage and the threads of the work are pressed against the measuring points. Any difference in lead from the master setting is registered on the dial gage.

Grinding Machine, Hole, Double-Head, No. 2

Bryant Chucking Grinder Co., Springfield, Vt.

"American Machinist," December 29, 1921.



The machine grinds such internal surfaces as the pin holes in gas engine pistons. Two sliding and swinging heads are suspended from the heavy bar at the top of the machine. Both wheels are in the cut together, each grinding an end of the hole. All the movements are controlled by the capstan wheel and traversing mechanism at the right. The wheels are fed to the work in grinding, or to the diamond in redressing, by a handwheel on the front of the machine. Standard Bryant internal grinding spindles are used, running at 20,000 r.p.m. The spindle driving pulleys run upon independent ball bearings, as also does the chuck or work holder. The chuck will take pistons up to 4½ in. in diameter and 4½ in. long. Floor space, 3 x 6 ft. Weight, 2,300 lb., including countershaft.

Clip, paste on 3 x 5-in. cards and file as desired

Obituary

HENRY HESS, founder of the Hess-Bright Manufacturing Co., Philadelphia, Pa., died in Atlantic City, N. J., on March 23. Mr. Hess was also the founder of the Hess Steel Corporation, of Baltimore, and was at one time president of the Engineers Club of Philadelphia, the Society of Automobile Engineers and vice-president of the American Society of Mechanical Engineers. He was also interested in many other engineering societies and held active membership in the following: American Institute of Mining Engineers, Society of Automotive Engineers, Franklin Institute and the Institute of Engineers of Great Britain.

JOHN MCDONALD, proprietor of the old Belpe-McDonald Foundry at Lawrenceville, Pa., and later organizer of the Pittsburgh Foundry and Machine Co., died at his home in Pittsburgh on March 21. He was 70 years old.

SAMUEL MCCLURE, vice-president and general manager of the Stewart Furnace Co., Sharon, Pa., died at his home in Sharon on March 24. He was 83 years old.

LOUIS A. DUHME, of Lawrenceburg, Ind., a member of the firm of George H. Bishop Saw and Edge Tool Manufacturing Co., died recently at his home. He was 69 years old.

LAWRENCE B. JENCKES, a director of the Crompton & Knowles Loom Works, Worcester, Mass., died on March 29. He was 55 years old.

WILLIAM F. MCNABB, secretary and treasurer of the Vanadium Metals Co., died suddenly in Pittsburgh on Mar. 28.

KNOX TAYLOR, president of the Taylor-Wharton Iron and Steel Co., died at his home in High Bridge, N. J., on April 4.

FRANK H. UNDERWOOD, retired manufacturer of machinery and belting, died at his home in Auburndale, near Boston, Mass., on April 3. He was 74 years old.

Trade Catalogs

"Germ Process" Motoils: Henry Wells Oil Co., 11 Haymarket, London, S. W. 1, England. Pamphlet containing information of value to those interested in the lubrication of plant and machinery.

Sprague Dynamometer: The Sprague Electric Works, New York City, N. Y. Bulletin No. 48,716 describing the Sprague electric dynamometer used in research work in various plants and laboratories.

Air Compressors: Curtis Pneumatic Machinery Co., St. Louis, Mo. A thirty-six page catalog describing a line of air compressors. Particular attention is given to the Model B, single stage, two stage and truck tire air compressors.

The Spindle Book: Jacobs Manufacturing Co., Hartford, Conn. A sixty-page well-bound reference book containing the spindle specifications of various types of drilling equipment. The book is made up of the names of sixteen firms using taper shank drills, taps or drill chucks, with the kind of equipment used. The book is intended for free distribution among dealers in machine tools and supplies.

Commutator Troubles: The Martindale Electric Co., Cleveland, Ohio. A four-page circular covering commutators, grinding and undercutting. A separate card gives a list of commutator troubles, their causes and remedies.

Flexible Shaft Equipment: The Hergi Manufacturing Co., Bridgeport, Conn. A catalog describing and illustrating several tools adapted for grinding, chipping and screwdriving. The equipment is of the portable type featuring flexible shafts and couplings.

Johnson Tools: Johnson Tool Co., Providence, R. I. Circular illustrating and describing the Johnson cutter plate and die milling machine. Specifications and working data are inclosed.

Whiting Cranes: The Whiting Corporation, Harvey, Ill. A four-page circular describing in a general way the Whiting line of electric and hand-power travelers, bucket handling and gantry jib, pillar and bracket cranes.

Electric Grinders: Columbia Manufacturing Co., Belleville, Ill. Supplement A to Grinder Book No. 26 describing a line of electric grinders and buffers; also the self-contained type of grinder. List prices are included.

Deschanel Cableway. Deschanel Engineering Corporation, New York, N. Y. The Deschanel cableway bulletin describing a single line cableway for use in handling materials in railroad yards, docks, power houses and other plants. The bulletin contains much useful information and interesting reading matter.

Torchweld Instructions. Torchweld Equipment Co., Chicago, Ill. A very valuable instruction book for oxy-acetylene welding, cutting, lead burning and carbon burning. The information is presented in an easy reading manner and would be valuable to shop men or executives.

Locomotive Repairs. The Cincinnati Milling Machine Co., Cincinnati, Ohio. A large thirty-two page booklet of data and experimental matter in milling operations in railroad repair work. The booklet is intended to show the variety of work that can be done in railroad shops by Cincinnati milling machines, and gives some interesting data compiled from experiments.

Book Reviews

Milling Cutters and Milling. A treatise based on the results of experiments conducted by Prof. Airey of the University of Michigan and Carl J. Oxford, chief engineer of the National Twist Drill and Tool Co., 69 pp., 5 x 7½ in. Illustrated. Published by the National Twist Drill and Tool Co., Detroit, U. S. A. Price, $1.

A recent paper presented before the American Society of Mechanical Engineers gave the results of experimental research on milling cutters carried on by Prof. Airey and Mr. Oxford at laboratories of the University of Michigan. In this book the data gathered during the course of the experiments and previously are treated in a somewhat less technical manner for those interested in the art of milling.

The authors point out that the discovery, made some years ago, that a given amount of material could be removed with less power if a cutter with few teeth were used than if the cutter had more teeth, "would have been very important if the proper deductions had been made and incorporated in the design of milling cutters. However, it was simply concluded that the coarse-tooth cutter in itself was a more efficient tool. * * * A careful analysis of the discovery mentioned shows us, not the efficiency of coarse-tooth cutters, but the efficiency of taking heavy instead of thin chips." They contend that sufficient chip space is the important factor in determining the tooth spacing.

The book is easy reading and is a worth while contribution to our knowledge of cutting metals.

Materials of Construction. By the late Prof. Adelbert P. Mills of Cornell University. Second edition, edited by Harrison W. Hayward, professor of materials of engineering, Massachusetts Institute of Technology. Cloth board covers, 476 pp., 6 x 9 in., 192 figures. Published by John Wiley & Sons, Inc., 432 Fourth Ave., New York, N. Y. Price, $4.

In this second edition, the book has not been changed fundamentally from the original work published in 1915. However, certain of the chapters have been condensed and parts of others have been rewritten, while several new chapters have been added. In addition, the book has been divided into sections, each treating of a different material employed in construction.

The volume treats of the manufacture, properties and uses of various materials employed by the engineer, the subjects being covered in considerable detail. However, intricate problems in chemistry and metallurgy are not handled. Although the treatment is more comprehensive than ordinarily required for classroom purposes, the incorporation of valuable material in the volume increases the usefulness of the book as a reference work.

The subjects treated in the various sections are: Plaster, lime and natural cement; portland cement and concrete; stone; bricks and other clay products; the ferrous metals; the non-ferrous metals and alloys; timber; rope; and mechanical fabrics. The most extended treatment is, of course, given on the subject of the ferrous metals.

Forthcoming Meetings

National Metal Trades Association: Annual convention April 17 to 20, Hotel Astor, New York City. H. W. Fisher, 1022 Peoples Gas Building, Chicago, Ill., secretary.

American Gear Manufacturers' Association: Sixth annual meeting, Buffalo, N. Y., April 20 to 22. Secretary, F. D. Hamlin, 4401 Germantown Ave., Philadelphia, Pa.

Southern Supply and Machinery Dealers Association: Annual meeting, Birmingham, Ala., April 24 to 26. (In conjunction with American Supply and Machinery Manufacturers Association.) Secretary, A. M. Smith, c/o Smith-Courtney Co., Richmond, Va.

National Machine Tool Builders' Association: Spring convention, Hotel Traymore, Atlantic City, N. J., April 25 and 26. Ernest F. DuBrul, 817 Provident Bank Bldg., Cincinnati, Ohio, general manager.

National Research Council: Annual meeting of executive board, April 26, Washington, D. C. A. D. Flinn, 29 West 39th St., New York City, chairman.

Society of Industrial Engineers: Annual meeting April 26, 27 and 28, Detroit, Mich. G. C. Dent, 327 La Salle St., Chicago, Ill., business manager.

National Association of Manufacturers: Annual meeting, Waldorf-Astoria Hotel, New York City, May 8, 9 and 10. Secretary, George Boudinot, 50 Church St., New York.

American Society of Mechanical Engineers: Spring meeting, Atlanta, Ga., May 8 to 12. Secretary Calvin W. Rice, 29 West 39th St., New York City.

National Supply and Machinery Dealers Association: Annual Convention, Atlantic City, May 8 to 10. (In conjunction with American Supply and Machinery Manufacturers Association.) Secretary, Thomas A. Fernley, 505 Arch St., Philadelphia, Pa.

Foreign Trade Council: Annual Convention, Philadelphia, Pa., May 10 to 12. Secretary, O. K. Davis, 1 Hanover Square, New York City.

United States Chamber of Commerce: Annual meeting, Washington, D. C., May 16 to 18. Secretary, D. A. Skinner, Riggs Bldg., Washington, D. C.

National Association of Office Managers: Annual meeting, Washington, D. C., May 18 to 20. Secretary, F. L. Rowland.

American Society for Steel Treating: Pittsburgh Section meeting, Bureau of Mines Auditorium, Pittsburgh, Pa., May 25 and 26.

American Foundrymen's Association: Annual meeting, Rochester, N. Y., week of June 5. Secretary, C. E. Hoyt, 140 South Dearborn St., Chicago, Ill.

American Railway Association: Section III, Mechanical: Annual meeting, Atlantic City, June 14 to 21. (Formerly the Master Car Builders and the Association of Master Mechanics.)

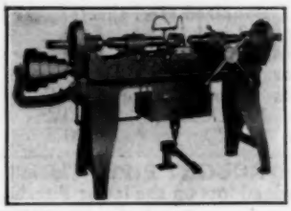
Society of Automotive Engineers: Summer meeting, White Sulphur Springs, W. Va., June 20 to 24. C. F. Scott, 29 West 39th St., New York City, is chairman of the convention committee.

American Society for Testing Materials: Twenty-fifth annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, June 26 to July 1. Secretary, C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Reaming and Chamfering Machine, Opposed Spindle
Murchey Machine and Tool Co., Detroit, Mich.
"American Machinist," December 29, 1921.

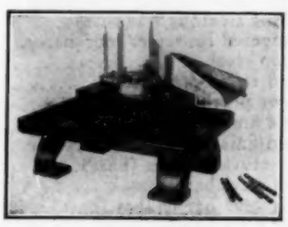


The machine is intended for reaming and chamfering nipples, but can be equipped with dies for threading nipples from ¼ to ¾-in. pipe size, or can be arranged for threading tees, valves, studs and other work threaded on both ends. The nipple is held in a central vice opened and closed by a treadle. The spindles carrying the tools are fed to the work by the pilot wheel. The countershaft has two drive pulleys for different speeds, and together with a 4-step cone pulley, provides for eight changes of speed. The capacity is for nipples for ¼ to 2-in. pipe, and 12 in. in length. Floor space, 8 x 2 ft. Weight, 1,200 lb.

Blower Unit, Motor-Driven, Positive-pressure, Stewart
Chicago Flexible Shaft Co., Chicago, Ill.
"American Machinist," December 29, 1921.

This blower unit supplies the pressure for a heat-treating furnace independent of the main power plant; and obviates the expense of running the large plant motor when only enough power is required to operate the blower. It is adaptable for small installations, and is made in four sizes accommodating blowers Nos. 3 to 6 with motors of from 1 to 2½ hp.

Marking Machine, Tubing, Rotary
Noble & Westbrook Manufacturing Co., Hartford, Conn.
"American Machinist," December 29, 1921.

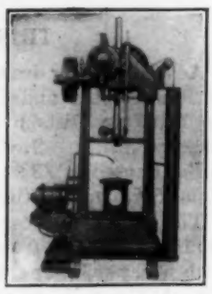


The machine is used for stamping names and patent marks on small tubing, and is power driven through a three-step cone pulley. Power is transmitted to the table through worm gearing. The table of the machine revolves, passing the work over the die and making the mark. It is divided into six equal parts, each having a mandrel upon which the work is fed by hand. A cam, raising a lever, ejects the work automatically. The machine can be furnished for marking any size tubing of short length. It weighs about 90 lb.

Speed Transformer, Combined Worm and Spur Gear
Natisch Gear Works, 451 Hudson Ave., Brooklyn, N. Y.
"American Machinist," December 29, 1921.

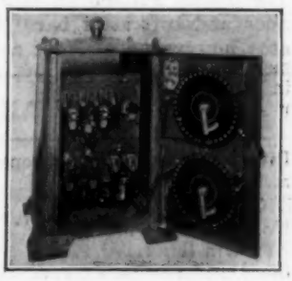
The transformer can be furnished for speed reductions ranging from 75:1 to 600:1 by using different gear ratios. The illustration shows a transformer for delivering ½ hp. at a speed reduction of 600:1. The case is cast iron, oil tight and rust proof.

Broaching Press, Vertical, Power
Lucas Machine Tool Co., Cleveland, Ohio.
"American Machinist," December 29, 1921.



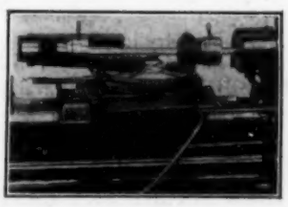
The machine is intended for the operation of push-broaches. It requires only short broaches, and allows the work to rest on a horizontal surface. Motion is transmitted to the ram through gearing controlled by a lever at the front. A gage mounted on the ram registers pressure exerted. The motor runs at 1,200 r.p.m., and is of either 7½ or 10 hp. The machine is made in two sizes, with capacities of 15 and 30 tons, respectively. The speed of the ram on the cutting stroke is 9 ft. and 6 ft. per minute respectively, and on the return stroke, 21 and 15 ft. per minute. The maximum distance from base to ram is ordinarily 48 in., but may be either 60 or 72 in. Weights, 2,900 and 3,800 lb. respectively. Export box, 125 and 150 cubic feet.

Control, Planer, Electric, G.E.
General Electric Co., Schenectady, N. Y.
"American Machinist," December 29, 1921.



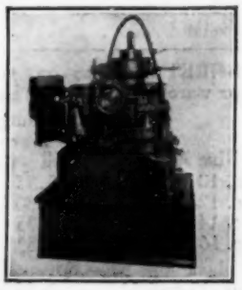
The apparatus prevents tables of electrically controlled planers from overtraveling, employing the dynamic system of braking. The equipment consists of a control panel on which are mounted rheostats and contactors, resistance, master switch or push button, which is used in connection with a standard direct-current, reversible adjustable-speed motor. The control is furnished in two types, one with and one without a resistance-selecting contactor. The selective resistance contactor enables the machine to operate with small tool clearance, and also where the duty varies from no load to full load, and where cuts are made to the end of the travel.

Staybolt Attachment, Threading
Acme Machine Tool Co., Cincinnati, Ohio.
"American Machinist," December 29, 1921.



The attachment is intended for use on turret machines. Two dieheads are used, and when set by a master or staybolt tap, their simultaneous cutting insures that both threaded portions on the staybolt will have the same lead as a continuous thread. The diehead at the rear is adjustably mounted, so that any length of staybolt within range of the adjustment can be cut. The attachment is made to fit the 2½ x 26-in., 3½ x 36-in., and No. 3 universal machines. By its use staybolts can be made from forging or from a bar.

Gear Shaper, High-Speed, No. 7
Fellows Gear Shaper Co., Springfield, Vt.
"American Machinist," January 5, 1922



The shaper is intended to handle any form of gear in a standard automobile transmission, and can also be adapted to the cutting of helical and herringbone gears. It performs roughing and finishing cuts automatically at the same setting and with the same cutter. A gear-type cutter is used to generate the teeth. The light weight cutter spindle is held in a straight path by guides, and is reciprocated by a connecting rod and crank arm. The work spindle carries a reverse-taper arbor. Gears are provided for securing seven feeds. The coarsest feed is 435 strokes for one revolution of the cutter; the finest feed is 1,735. Roughing and finishing cuts are taken at the same feed and speed.

Clip, paste on 3 x 5-in. cards and file as desired

The Weekly Price Guide

THIS WEEK'S MARKET

Advances—Pig iron, No. 2 foundry, up $1 per gross ton in Philadelphia and Chicago; foundry, basic and bessemer up $2.46 in Pittsburgh. Basic in better demand in the Eastern states. Steel sheets up $3 per ton at Pittsburgh mills; quoted at $3.90 as against $3.75@$3.90 per 100 lb. in New York warehouses.

Tin quoted in New York at 30¼c. as against 29⅝c.; lead at 5¼c. advanced from 5⅛c. and zinc at 5⅝c. as compared with 5⅝c. per lb. one week ago. Brass rods up 1c. and brass wire 1¼c. per lb. in Cleveland.

Declines—Nickel ingots and shot quoted at 36c. as against 41c; electrolytic at 39c. as compared with 44c. per lb. formerly. Monel metal products down 2c.@6c. per lb. f.o.b. Bayonne.

The official Pittsburgh mill price of $1.50 for structural shapes and soft steel bars continues to gain in firmness. Plates, however, are quoted at $1.40@$1.50 per 100 lb.

IRON AND STEEL

PIG IRON—Per gross ton—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$21.00
Northern Basic	21.02
Southern Ohio No. 2	21.52
NEW YORK—Tidewater Delivery	
Southern No. 2 (Silicon 2.25 to 2.75)	26.87
BIRMINGHAM	
No. 2 Foundry	16.50
PHILADELPHIA	
Eastern Pa., No. 2x, 2.25-2.75 sil	22.26
Virginia No. 2	28.74
Basic	20.25
Grey Forge	21.00
CHICAGO	
No. 2 Foundry local	20.70
No. 2 Foundry, Southern, sil 2.25@2.75	22.67
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	21.46
Basic	20.46
Bessemer	21.46

IRON MACHINERY CASTINGS—In cents per pound:

	Light	Medium	Heavy
Pittsburgh	9.0	6.0	3.0
Philadelphia	8.0	5.0	2.63
Atlanta	5.5	4.5	4.0
Detroit	7.0	4.5	3.0
Birmingham	16.0	7.5	2.5
Denver	8.0	6.0	5.0
New Orleans	6.0	5.0	4.0
Minneapolis	9.0	6.0	4.5
New York	9.0	6.0	3.0
Cincinnati	6.0	5.0	4.5
Cleveland	6.75	4.5	2.6

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.25	3.28	3.10	3.38
No. 12	2.30	3.33	3.15	3.43
No. 14	2.35	3.38	3.20	3.48
No. 16	2.55	3.48	3.30	3.58
Black				
Nos. 17 and 21.	2.85	3.80	3.55	3.95
Nos. 22 and 24.	2.90	3.85	3.60	4.00
Nos. 25 and 26.	2.95	3.90	3.65	4.05
No. 28	3.00	4.00	3.75	4.15
Galvanized steel sheets:				
Nos. 10 and 11.	3.00	3.90	3.75	4.15
Nos. 12 and 14.	3.10	4.00	3.85	4.25
Nos. 17 and 21.	3.40	4.30	4.15	4.55
Nos. 22 and 24.	3.55	4.45	4.30	4.70
No. 26	3.70	4.60	4.55	4.85
No. 28	4.00	4.90	4.75	5.15

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Black	Galv.	BUTT WELD Inches	Iron Black	Galv.
1 to 3	71	58½	⅜ to 1½	44½	29½
LAP WELD					
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
1 to 1½	69	57½	⅜ to 1½	44½	30½
2 to 3	70	58½			
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	62½%	48½%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	59½%	45½%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 10%. Cast iron, standard sizes, 32–5% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.00	6.00	4.50
Spring steel (light) (base)	6.00	6.00	6.00
Coppered Bessemer rods (base)	7.00	8.00	6.03
Hoop steel	3.38	2.56	3.13
Cold rolled strip steel	6.25	8.25	6.50
Floor plates	4.60	4.56	4.98
Cold finished shafting or screw	3.35	3.00	3.15
Cold finished flats, squares	3.85	3.50	3.65
Structural shapes (base)	2.48	2.31	2.38
Soft steel bars (base)	2.38	2.21	2.28
Soft steel bar shapes (base)	2.38	2.21	2.28
Soft steel bands (base)	2.98	....	2.88
Tank plates (base)	2.48	2.31	2.38
Bar iron (2.00@2.10 at mill)	2.38	2.21	2.28
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
⅛	8.50		12@13
5/32	7.15		11@12
3/16 to ¼	6.75		10@11

METALS

Current Prices in Cents Per Pound

	New York	Cleveland	Chicago
Copper, electrolytic (up to carlots), New York			13.50
Tin, 5-ton lots, New York			30.50
Lead (up to carlots), St. Louis, 4.90; New York			5.25
Zinc (up to carlots), St. Louis, 5.27½; New York			5.62½
Aluminum, 98 to 99% ingots, 1-15 ton lots	19.20	20.00	18.00
Antimony (Chinese), ton spot	5.00	6.50	6.25
Copper sheets, base	19.50@20.50	20.50@21	23.00
Copper wire (carlots)	14@14.25	17.00	16.25
Copper rods (ton lots)	19.25	21.50	19.50
Copper tubing (100-lb. lots)	20.75	22.50	23.00
Brass sheets (100-lb. lots)	16.25	16.50	18.75
Brass tubing (100-lb. lots)	18.00	18.50	20.50

—Shop Materials and Supplies

METALS—Continued

Brass rods (1,000-lb. lots)	14.25	16.00	15.75
Brass wire (carlots)	16.75	17.75	.....
Zinc sheets (casks), (8% dis. carlots)	9.50	17.25	15.75
Nickel (ingot and shot), Bayonne, N. J.	36.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	39.00	.....	.....
Solder (½ and ½), (caselots)	18.00	22.00	19.00
Babbitt metal (best grade)	30.80	39.50	36.00
Babbitt metal (commercial)	15.50	13.50	9.00

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	50
Cold drawn rods, Grades "A" and "C" (base)	60
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	54
Manganese nickel hot rolled (base) rods "D"—high manganese	57

Base price of monel metal in cents per lb., f.o.b. Bayonne, N. J.:

Shot	32.00	Hot rolled machined rods (base)	48.00
Blocks	32.00	Hot rolled rods (base)	40.00
Ingots	38.00	Cold drawn rods (base)	50.00
Sheet bars	40.00	Hot rolled sheets (base)	45.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	10.00	10.50	10.25
Copper, heavy, and wire	9.50	10.00	9.25
Copper, light, and bottoms	8.50	8.50	8.25
Lead, heavy	3.75	3.50	3.65
Lead, tea	2.75	2.50	3.00
Brass, heavy	5.75	5.50	8.00
Brass, light	4.25	4.25	4.75
No. 1 yellow brass turnings	5.00	5.00	5.00
Zinc	2.75	2.00	2.50

TIN PLATES—American Charcoal Plates—Bright—Cents per lb.

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	18.25	18.50
IX,	20x28, 112 sheets	23.00	21.00	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.00	17.00
IX,	20x28, 112 sheets	20.00	18.75	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	12.00	14.50
IC,	112 sheets	12.80	12.30	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.07½@$0.10	$0.12	$0.12
Cotton waste, mixed, per lb.	.055@.09	.09	.09
Wiping cloths per M., 13¼x13¼	.....	50.00	55.00
Wiping cloths per M., 13¼x20½	.....	55.00	65.00
Sal soda, 100 lb. lots	2.80	2.50	2.65
Roll sulphur, 360 lb. bbl., per 100 lb.	2.85	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.82@.83	1.06	.90
White lead, dry or in oil	100 lb. kegs.	New York, 12.25	
Red lead, dry	100 lb. kegs.	New York, 12.25	
Red lead, in oil	100 lb. kegs.	New York, 13.75	
Fire clay, per 75 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per net ton	$3.25@$3.50	
Coke, prompt foundry, Connellsville	per net ton	$4.25@$4.75	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	60-5%	60-10%	60-10-10%
1½ and 1¼x3 in. up to 12 in.	50%	60-10-10%	60-10%
With cold punched sq. nuts	50%	.....	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	55%	.....	$4.00 off
Button head bolts, with hex. nuts	35%	$3.90 net	.....
Hex. head and hex. nut bolts	40%	.....	65-5%
Lag screws, coach screws	65%	.....	65-5%
Square and hex. head cap screws	75—10%	75%	70-10%
Carriage bolts, up to 1 in. x 30 in.	50-10%	60-10%	50-5%
Bolt ends, with hot pressed nuts	60%	.....	55%
Tap bolts, hex. heads	25%	.....	.....
Semi-finished nuts ⅝ and larger	75%	75-10%	80%
Case-hardened nuts	65%	.....	.....
Washers, cast iron, ⅛ in., per 100 lb. (net)	$4.50	$3.50	$3.50
Washers, cast iron, ¼ in. per 100 lb. (net)	3.75	3.50	3.50
Washers, round plate, per 100 lb. Off list	4.00	.....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, hex., per 100 lb. Off list	3.00	3.50	4.00
Rivets:			
Rivets, 7/16 in. dia. and smaller	60-5%	60-10-10%	65-5%
Rivets, tinned	60-5%	60-10-10%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb. (net)	$3.35	$3.25	$3.00
Cone heads, ditto (net)	3.45	3.35	3.10
1⅛ to 1⅞-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅛ in. diameter *EXTRA*	0.15	.....	0.15
⅜ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.....	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb. *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$3.35 base
Copper rivets	60-5%	50%	50-10%
Copper burs	40%	50%	.....
Lard cutting oil (50 gal. bbl.) per gal.	$0.65	$0.50	$0.67½
Machine oil, lubricating, (50 gal. bbl.) per gal.	0.45	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls)			
Leather:			
Light grade	50%	50-5%	60-10%
Medium grade	40-5%	40-10-2½%	50%
Heavy grade	35%	40%	40-5%
Rubber and duck:			
First grade	60-5%	50-10%	40-10%
Second grade	60-10-5%	60-5%	60-5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets, Flint paper	$5.84	$3.85	$6.48
Emery paper	8.80	11.00	8.80
Emery cloth	27.84	32.75	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll,	4.50	.....	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	1.32	.....	1.49
Cloth	3.02	.....	3.20

NEW and ENLARGED

Machine Tools and Machinery Wanted

Machinery wants published without charge

Machine Tools

Conn., Bridgeport—The Fabric Machine Co., 307 Centre St., manufacturer fabric cutting machinery—one 12 in. or 13 in. x 16 ft. lathe (used).

Del., Claymont—The Worth Steel Co.—motor driven plate shear, with knife 80-110 in. long, ¾ in. cutting capacity.

D. C., Wash.—The Southern Ry. 1300 Pennsylvania Ave., C. R. Craig, Genl. Purch. Agt.—valve seat planer.

Ia., Dubuque—Adams Co., 295 6th St.—sheet metal brake for 10 gauge material, (used preferred).

Ia., Muscatine—The Roach & Musser Co.—Model B Mattison turning lathe.

Ill., Chicago—The Atchison, Topeka & Santa Fe R.R., 80 East Jackson Blvd., M. J. Collins, Purch. Agt.—one 500 ton double end hydraulic wheel press; one 90 in. motor driven driving wheel lathe; one heavy duty double end car axel lathe with motor drive; one 300 lb. Beaudry hammer; one 52 in. car wheel lathe; one 4 ft. radial drill and one 15 ton crane.

Ill., Chicago—The Natl. Stamping & Electric Wks., 424 South Clinton St.—two Brown & Sharpe No. 2½ hand screw machines.

Ill., Chicago — The Paidar Co., 1129 North Wells St.—one No. 2 Universal milling machine; one 4 spindle back geared drill press; one 2 spindle small drill press.

Ill., Chicago—W. A. Spinks & Co., 362 West Erie St., A. Hoskin, Purch. Agt.—one small engine lathe, Star preferred or similar make.

Ill., Chicago—The Underwriters Laboratories, 207 East Ohio St., W. H. Merrill, Pres.—one 20 or 24 in. Barnes Drill Co., self oiling, all geared drill and tapper, geared motor drive, also a 24 in. Potter & Johnson universal shaping machine, geared motor drive, (both used).

Ill., Englewood—The Englewood Optical Co., 5958 Eggleston Ave., E. E. Hilborn, Mgr.—small screw cutting lathe, bench or engine type with draw in spindle and collets, milling attachment and usual equipment. Want to use lathe for experimental tool and instrument work, 6 to 8 in. swing, 15 to 18 in. between centers, weight between 75 and 150 lb., small bench drill press of sensitive type and small shaper, 4 to 8 in. stroke, if possible with slotting attachment, or milling machine that would answer same purpose as shaper.

Ky., Central City—The Triangle Machine Wks., Inc., W. B. Mix, Secy. Treas. and Genl. Mgr.—one 26 ft. and one 8 ft. lathe; milling machine; 48 in. radio drill press; 60 ton hydraulic press; cylinder grinder; hack saw and other small tools, (used).

Mich., Detroit — The Central Machine Products Co., 1052 Morrell St.—one 20 in. to 24 in. back geared drill press (used).

Mo., Joplin—Fifiels & Jones, 2330 Anna Baxton Ave. (machine shop and planing mill), O. K. Jones, Mgr.—planing machinery and lathe.

Mo., Joplin—The Ozark Motors Co., 822 Joplin St., A. McClaren, Purch. Agt.—boring machine for automobile cylinders.

N. J., Plainfield—The Natl. Vitaphone Corp., 112 North Ave., (phonographs), C. B. Repp, Pres.—punch presses, screw machines and other automatic machinery.

N. Y., Brownville—F. Page—threading and tapping machine for Water Bd.

N. Y., Lowville—G. A. Smith Co., State and Jackson St., G. A. Smith, Purch. Agt.—small back geared engine lathe; miller and upright post drill; air compressor and tank.

N. Y., Ogdensburg—E. and H. Burns Co., 22 Lake St.—sheet metal punch press and one forming roll.

N. Y., Ogdensburg—Starter, Ignition & Battery Service Co., 23 Washington St., G. P. Haven, Purch. Agt.—light lathe to carry polishing mandrel also complete battery recharging machinery and equipment.

N. Y., Utica—A. Becker, 513 William St.—one 16 in. black geared engine lathe and bench miller also high speed twist drills.

N. Y., Waverly—The James Taylor Co., Fulton St., (battery repair and charging)—complete battery charging plant and machinery and equipment for repairs.

O., Cincinnati—The Jones Machine Tool Co., 435 East Pearl St., A. Jones, Purch. Agt.—one 48 in. x 20 ft. lathe; 72 in. boring mill; 60 in. open side planer, 12 ft. table; 24 in. shaper.

O., Cincinnati—W. Powell Co., 3233 Colerain Ave., manufacturer of valves—double spindle milling machine for milling tapered squares on valve stems.

O., Cincinnati—The Randle Mchy. Co., 1735 Powers St., G. Bierbaum, Purch. Agt.—angle iron shear to cut and punch 6 in. angles; 8 in. Bignall & Keeler pipe threading machine, motor driven, 250 volt, D. C. motor; hydraulic wheel press 200 to 300 ton; car wheel boring mill for wheels 33 in. diameter, on thread, and to bore 4¼ in. hole.

O., Cincinnati—The Smith Mchy. Co., 6 East 3rd St., J. G. Smith, Purch. Agt.—one No. 60 Heald cylinder grinder; 20 in. drill press and a No. 13 Toledo or No. 39 Bliss press with 3 in. stroke.

O., Cleveland—Chandler & Price Co., 6500 Carnegie Ave.—heavy duty drilling machine.

O., Cleveland—The Cooper Spring Co., 2220 Center St.—Brinnell-Hardin testing machine.

O., Cleveland—The Rail Welding & Bonding Co., 1615 Collamer St.—one 80 to 100 ton geared press, (used).

O., Marion—The Murdock Dishwashing Machine Co., P. H. Ryder, Pres.—several kinds of metal working machinery.

Pa., Corry—The United States Chair Co., J. B. Patterson, Pres. and Treas.—one back knive lathe.

Pa., Pittsburgh—C. L. Flaccus Glass Co., 1107 Empire Bldg.—one 16 in. and one 18 in. lathe suitable for glass mould work.

Wis., Madison—W. F. Clark, 2105 Keyes Ave.—equipment for garage, including pumps, oil storage tank, etc.

Wis., Milwaukee—A. Graunke & Son, 431 28th St. (sheet metal workers)—sheet metal brake and gutter former.

Wis., Milwaukee—The Wisconsin Auto Exchange, 115 Sycamore St.—one gear press.

Wis., Milwaukee—C. Zawatzki, 851 Sobieski St.—lathe, drill press and gasoline storage tank and pump.

Wis., Sparta — F. J. Domke — equipment and auto repair machinery for proposed garage on South Water St.

Wis., Stockbridge — The Stockbridge Sheet Metal & Plumbing Co., c/o N. Karls—sheet metal working machinery.

Ont., Delhi — M. C. Beecroft — complete equipment for modern garage and auto repair shop. Estimated cost, $10,000.

Ont., Sarnia—The Dominion Alloy Steel Corp., Sarnia, C. H. Wills, Marysville, Mich., interested — equipment and electrically operated furnaces for steel plant on St. Clair St.

Ont., St. Thomas—The City Council, A. Stokes, Chn. — equipment for repair shop and gasoline station.

Machinery

Fla., Bradentown—J. L. Waterbury Co.—complete narrow gauge railroad equipment, including locomotives, cars, tracks etc.

Ga., Thomasville — The Dawes Constr. Supply Co., P. O. Box 314, J. P. Dawes, Mgr.—complete line of machinery for the manufacture of sand paper.

Ia., Des Moines—The Des Moines Printers Exchange, 310 2nd St.—printing press and stereotype machine.

Ill., Chicago—G. A. Deveneau, 652 South State St.—filter press, 2 ft. square, 8 to 12 leaves, with or without pump, electrical or steam driven (used).

Mass., Boston—W. H. Field Co., 39 Washington St., N.—woodworking machinery.

Mass., Whitinsville—The Whitin Machine Wks., Main St.—one 20 ton hand power crane, 45 ft. 8 in. span.

Mich., Detroit—A. W. Fellers, 6035 14th Ave.—planer and matcher, (used).

Mich., Detroit—E. R. Sloat, 5983 Woodward Ave.—complete plating outfit, (used).

Minn., Baudette—V. H. Ricci, P. O. Box 101—type setting machine.

Minn., Minneapolis—H. C. Johnson, 2730 Lyndale Ave., S. (creamery products)—power machinery, churns, mixers, etc.

Minn., Minneapolis — The Strutwear Kniting Co., 731 East 14th St. — W. A. Struthers, Secy.—kniting machinery, full fashion, for proposed factory.

Minn., Minneapolis—The Western Newspaper Union, 200 North 3rd St.—cylinder cutter.

Minn., St. Louis Park—The Minneapolis Concrete Co., J. C. Melville, 818 Builders Exchange Bldg., Minneapolis, Secy.—belt elevators, mixers, block machine, gravity conveyors, lift truck, and two electric motors.

Minn., Wells—The Mirror, J. E. Schofield, Purch. Agt.—four page press.

Mo., Dodson—L. Stewart—one 6 x 9 circular printing press and type.

Mo., Joplin—W. F. Bamett, 1607 Main St.—electric paper cutter for job printing plant.

Mo., Joplin—D. W. Gahagan & Son, 107 West 9th St., E. M. Gahagan, Purch. Agt.—printing press.

Mo., Joplin—The Joplin Machinery Exchange, 211 East 4th St., R. M. Clark, Mgr. —two or three 2, 3, 4 or 5 ton 24 or 36 in. gage electric locomotives for mine work, either storage battery or trolley type (used).

Mo., Kansas City — Brown-Preuss Stationery Co., 918 Grand Ave., J. Brown, Purch. Agt.—multi-color printing press.

Mo., Kansas City—The Drovers Telegram, Co., Inc., 1505 Genesee St., W. P. Neff, Purch. Agt.—folding machine for newspaper plant.

Mo., Kansas City—The Lion Oil & Refining Co., 622 Finance Bldg., V. H. Smith, Secy.—one 1,200 bbl. agitator; 4 miles of 4 in. pipe line; couplings; 15,000 bbl. steel water top tank; 8 miles of 2 in. extra heavy pipe; miscellaneous valves and fittings.

Mo., Kansas City—The Lowell Press, 3017 Main St.—printing press and supplies for job printing plant.

Mo., Maplewood — H. E. Lousche, 7208 Anna St.—woodworking machinery for saw mill.

Mo., Springfield—W. E. Green, 719 Boonville Ave.—small tools including hammers, anvils, chisels, wrenches and automatic bellows.

Mo., Valley Park—The Barbour Boat and Pattern Co.—straightening machine and rolls.

Neb., Lincoln—The Nebraska Material & Supply Co., 117 North 9th St., W. H. Bixby, Purch. Agt.—belt driven air compressor, capacity 50 cu.ft., 60 to 70 lb. pressure, (used).

N. J., Newark—W. H. Hall, 563 18th Ave. power feed rod and Dowel machine, Hawker No. 2 (used).

N. Y., Binghamton—The Binghamton Limestone Co.—rock crushing, conveying and grinding machinery for agricultural lime plant.

N. Y., Binghamton—W. S. Jennings, 91 Carroll St.—pneumatic marble cutting, polishing and marking machinery and tools.

N. Y., Brooklyn—Berman Bros. & Lindeman Co., Inc., 2384-2392 Atlantic Ave., manufacturers of knit goods—knitting machines, 7 and 9 in. Sniker top, 2 or 4 feed, 285 and 365 needles to the cylinder.

N. Y., Brooklyn—A. Starke, 50 Columbia St.—electric hoist, ½ ton, a.c.

N. Y., Buffalo—Bd. Educ., 1401 Telephone Bldg., D. J. Sweeney, Purch. Agt.—receive bids until April 19 for woodworking tools.

N. Y., Caledonia—The New York Alfalfa Mills, H. R. McKay, Purch. Agt.—grinding, sieving, elevating and conveying machinery and equipment for feed mill.

N. Y., Canandaigua—The Central Sash & Door Mfg. Co., R. E. Pool, Purch. Agt.—double surface planer; rip saw and table; sander.

N. Y., Cattaraugus—F. E. Cobane, Jefferson St.—air compressor and tank 200 lb. pressure; hydraulic rim press and 2 ton triplex chain hoist.

N. Y., Corning—Allen & Andrews Chocolate Co., 67-71 West Market St.—W. W. Allen, Purch. Agt.—candy making machinery and equipment.

N. Y., Corning—The Corning Brush & Sponge Co., Hart St., A. Anderson, Fuller Ave., Purch. Agt.—special woodworking machinery for the manufacture of brush backs and handles.

N. Y., Deansboro—The Deansboro Feed & Lumber Co.—woodworking tools and equipment.

N. Y., Forestville—A. E. Dye Milling Co., H. A. Dye, Purch. Agt.—flour and feed grinding, grading, elevating and conveying equipment.

N. Y., Gainesville—The Gainesville Dairymen's League — machinery and equipment also cold storage system for proposed milk pasteurization and bottling plant.

N. Y., Gouverneur—The Gouverneur Limestone Co.—crushing and grinding equipment for the manufacture of agricultural lime.

N. Y., Gouverneur—The International Pulp Co.—talc grinding machinery.

N. Y., Henderson Harbor—The Snow Garage Co., G. Snow, Purch. Agt.—one 2½ ton capacity triplex chain hoist with 300 ft. track and traveler.

N. Y., Jamestown—C. F. Carlson, 19 Norwood Ave.—small blue printing machine.

N. Y., Lackawanna—W. J. Lohr Co., Lehigh Ave. and Ridge Rd.—machinery and equipment for 50 ton daily capacity ice plant.

N. Y., LaSalle—A. LeBar & Sons Co., Belden Ave. and River Rd., A. LeBar, Purch Agt.—machinery and equipment for artificial ice plant, 25 ton per day capacity.

N. Y., Lockport—A. W. Jack Corp.—machinery and equipment for the manufacture of asbestos paper.

N. Y., Lowville—The Bordner Cap Co., manufacturer of pasteboard bottle caps, C. W. Bordner, Purch. Agt.—special automatic machinery for cutting card board discs.

N. Y., Mohawk—The Elizabeth Street Garage—complete battery charging outfit with converter and panel; cylinder grinder (Heald or similar); two ton hoist.

N. Y., Naples—M. J. Maney—machinery for the manufacture of wire handles for grape baskets.

N. Y., Portchester—M. Di Leo, Westchester Ave.—conveying machinery for 300 ton coal bunker.

N. Y., Rochester—A. W. Hopeman & Son, 569 Lyell Ave.—woodworking machinery for proposed furniture factory on Hague St.

N. Y., Rome—The Rome Milk Corp., Inc., W. Murphy, Purch. Agt.—milk handling, pasteurizing and bottle capping machinery and equipment.

N. Y., Watertown—A. M. Osborne, 741 Davidson St.—bread and pastry mixing machinery and baking ovens.

N. Y., Wayland—J. E. Barber—printing press and job equipment.

N. C., Garner—N. L. Broughton Cotton Seed Co.—cotton seed culler.

N. C., Mt. Airy—Jones & Wilson, A. Jones, Purch. Agt.—hand rock crusher to handle about 5 yd. per hr.

N. C., Reidsville—The Amer. Products Corp., B. R. Stone, Mgr.—complete line of bottling machinery and equipment for small plant, including filling, corking and labeling machines, conveyors, etc.

N. C., Rutherfordton—The Taylor Lumber Co., W. C. Taylor, Mgr.—complete line of hand planing mill machinery.

N. C., Thomasville—J. P. Long—machinery and equipment for laundry.

N. C., Waynesville—The Natural Abrasive Mining Co. of America, F. R. Hewitt, Treas.—machinery for proposed grinding mill at Willets.

O., Akron—Brown Graves Co., 85 East Miller Ave.—one veneer jointer to point 86 in. veneers.

O., Cincinnati—The Economy Mchy. Co., 428 East Pearl St., J. Flynn, Sr., Purch. Agt.—double drum double cylinder hoisting engine, 7 in. x 10 in. cylinders.

O., Cincinnati—The Ohio Mchy. Co., 24 West 2nd St.—band saw; saw table; pony planer; jointer; planer and matcher; swing saw.

Pa., Corry—The Corry Jamestown Mfg. Co. (manufacturer of furniture)—several presses, smaller than 30 ton.

Pa., Pittsburgh—The Enterprise Fdry. Co., 1400 Nixon St.—foundry equipment to replace that which was damaged in recent fire.

Pa., Pittsburgh — T. A. North, 825 Magiinn Ave., N. S.—woodworking machinery.

Pa., Pittsburgh—The Standard Sanitary Mfg. Co., Preble Ave.—one 60 in. open side planer.

Pa., Pittsburgh—The Pittsburgh Supply Co., Ross St.—two 20 ton overhead cranes.

Pa., Westfield—The Pennsylvania Potash & Fertilizer Co.—machinery for the manufacture of potash-fertilizer. Exclusive rights to the Kreiss process.

S. C., Saluda—R. H. Etheridge, woodworking—knife grinder for planer bits, hand feed, also power feed ripsaw, (used).

S. C., Williston—L. M. Pearson—modern machinery and equipment for creamery.

Tex., Houston—The Worsham Bros. Motor Co., J. H. Worsham, Purch. Agt.—air compressor, 10 hp., power motor, air tank.

Va., Emporia—W. W. Rich—log saw mill complete, (used).

Va., Hopewell—The Hopewell Ice & Cold Storage Co., W. C. Ellis, Mgr.—electrically operated machinery for ice plant.

Va., Lodge—B. B. Dawson—canning machinery and equipment for small plant, (new or used).

Va., Lynchburg—The Texas Arkansas Petroleum Corp., P. O. Box 592, W. W. Hancock, Pres.—well drilling machinery and equipment.

Va., Norfolk—J. B. Porter, P. O. Box 255 —various small tools for tinning work, such as shears, cutters, cornice brakes, etc., also about 40 hp. tubular boiler, (used).

Va., Norfolk—The Tidewater Paper Co., Newcastle and Water Sts., R. A. Barrett, Purch. Agt.—one 10 x 15 job printing press, Chandler and Price preferred (used).

Va., Richmond—The Richmond Housing Co., P. O. Box 131—portable saw outfits.

Va., Williamsburg — The Peninsular Dairies, W. Gilley, Secy.—dairy machinery and equipment.

Va., Wytheville—R. P. Johnson, Lumber mill—locomotive dinky engine; conveyor loader for coal, sand, etc., also four side planer and matcher, (used).

Wis., Appleton—H. C. Kattke, 695 Appleton St.—blacksmith shop machinery and equipment.

Wis., Black River Falls—The Vaudreul Wood Products Co., R. Koehler, Purch. Agt. —power saws.

Wis., Eau Claire—The Northwestern Steel & Iron Wks., Spring and Ball Sts.—chain hoist for machine shop.

Wis., Junction City—The Cera Mfg. Co. —planer and saws.

Wis., Marshfield—Blum Bros. Co., 135 West 9th St. — woodworking machinery, power machine, motors, craters, etc., for proposed butter tub factory.

Wis., Marshfield—J. Froelich, Route 5—cheese making machinery, including vats and separator, line shaft drive.

Wis., Mayville—The Peerless Traveling Goods Co.—special machinery for proposed factory on Main St.

Wis., Merrill—Smith Bros. & Kuehl (woodworking), C. Kuehl, Pres.—planers, shapers, band saws and sawing machine.

Wis., Milwaukee—The Ackerman Oil Co., 221 Grand Ave. — gasoline storage tanks and pumps for proposed filling station at Cudahy.

Wis., Milwaukee — The Interior Woodwork Co., 521 Park St.—additional equipment including a motor generator set.

Wis., Milwaukee—The Plymouth Mfg. Co., address M. Mann, Plymouth, Wis.—machinery for the manufacture of dress goods, etc.

Wis., Milwaukee — W. J. Raley, 711 Chestnut St.—gas storage tank and pump.

Wis., Watertown—J. J. Locklin, 630 West Main St.—milk handling, pasteurizing and bottling equipment.

Wis., Waupon—C. A. Shaler Co.—special machinery and power machinery for vulcanizing plant.

Ont., St. Thomas—The St. Thomas Packing Co., W. H. Moody, Mgr.—materials and equipment for proposed cold storage plant.

Ont., Strathroy — The Butler Woolen Mills—woolen mill equipment.

Metal Working Shops

Conn., Bridgeport—The Bridgeport Auto Co., Inc., 386 Fairfield Ave., plans to build a 2 story service station on Courtland St. Estimated cost, $40,000. Architect not selected.

Cal., Los Angeles—E. A. Gray Co., 510 South San Pedro St., has awarded the contract for the construction of a 1 story machine shop. Estimated cost, $40,000.

Cal., Oakland — The Walnut Grove Creamery, 41st and Market Sts., has awarded the contract for the construction of a 2 story blacksmith shop on 41st and Market Sts. Estimated cost, $5,000.

Cal., San Pedro—The Regan Forge Co. has awarded the contract for the construction of a 1 story, 80 x 200 ft. foundry and machine shop. Estimated cost, $60,000.

Cal., Tranquility — The Tranquility Union High School Dist. is having plans prepared for the construction of various school buildings, including machine shop, farm mechanics building, etc. E. J. Kump, Rowell Bldg., Fresno, Archt.

Ill., Chicago—Z. E. Smith, Archt., 305 East 55th St., is receiving bids for the construction of a 2 story, 50 x 50 ft. factory at 414 East 34th St., for the Chicago Wheel & Spring Co. Estimated cost, $25,000.

Ill., Highland Park — Holmes & Flinn, Archts., 8 South Dearborn St., Chicago, are receiving bids for the construction of a 1 story, 50 x 140 ft. garage and auto repair shop on Laurel and 1st Sts., for G. H. Koon, 47 South St. John St. Estimated cost, $40,000.

Ill., Joliet—The Goodspeed Bros. Auto Co. plans to build a 1 story, 60 x 150 ft. garage. Estimated cost, $40,000. Architect not selected.

Ky., Central City—The Triangle Machine Wks., Central City, will build a 2 story, 75 x 100 ft. machine shop. Estimated cost, $25,000.

Mass., South Boston (Boston P. O.)—The National Can Co., Locust St., has had plans prepared for the construction of a 2 story, 92 x 160 ft. manufacturing building, 1 story, 20 x 60 ft. garage and a 3 story, 20 x 40 ft. storage building. Estimated cost, $125,000. A. A. Browne, 7 State St., Boston, Archt.

N. J., Atlantic City—The Union Transfer Co., 1004 Spring Garden St., Phila., has awarded the contract for the construction of a 1 story, 45 x 55 ft. and 105 x 165 ft. garage at 110-6 North Virginia Ave., here. Estimated cost $100,000. Noted Sept. 29.

N. J., Trenton—The Crescent Insulated Wire & Cable Co., Taylor and Olden Sts., has awarded the contract for the construction of a 2 story, 75 x 240 ft. and a 3 story, 60 x 120 ft. factory on Taylor St. Estimated cost, $50,000.

N. Y., Baldwinsville—C. L. Cadle, Supt. Pub. Wks., Albany, plans to build a barge canal repair plant, here. Estimated cost, $100,000. L. F. Pilcher, Albany, State Archt.

N. Y., Rochester—B. G. Costich, 251 Hayward Ave., plans to build a 50 x 146 ft. garage on Hayward Ave. Estimated cost, $40,000.

N. Y., Syracuse — The Franklin Automobile Co., 302 South Geddes St., plans to build an automobile factory. H. H. Franklin, Pres.

O., Cleveland—The Dille Mfg. Co., 684 East 82nd St., manufacturer of hardware, has awarded the contract for the construction of a 1 story, 45 x 75 ft. addition to its factory. Estimated cost, $40,000.

Ore., Portland — The Oregon Coal Co. plans to build 1 story blast furnaces. Estimated cost, $500,000. A. G. McKee Co., 2422 Euclid Ave., Cleveland, O., Archt. and Engr.

Pa., Derry—The Pittsburgh High Voltage Insulator Co. has awarded the contract for the construction of a 1 story, 95 x 160 ft. factory. Estimated cost, $80,000.

Pa., Kane—The McKean Chemical Co., Dahoga, plans to build a 2 story, 80 x 250 ft. chemical plant here. Estimated cost, $80,000. N. B. Bubb, Williamsport, Secy., Treas. and Mgr.

Pa., Phila.—The International Harvester Co. of America, 21 North 23rd St., is receiving bids for the construction of a 5 story, 100 x 130 ft. warehouse and a 1 story, 64 x 100 x 140 ft. service station on 16th St. and Indiana Ave. Estimated cost, $500,000. W. D. Price, 5408 North Central Ave., Chicago, Engr.

Wis., Beloit—J. T. Hetherington & Son, Archts., 38 South Dearborn St., Chicago, will soon receive bids for the construction of a 2 story, 100 x 130 ft. factory on Broad St., for J. H. Saris, 412 Broad St. (manufacturer of automobiles). Estimated cost, $75,000.

Wis., Madison—W. F. Clark, 2105 Keyes Ave., is having plans prepared for the construction of a 1 story, 60 x 186 ft. garage and filling station on University St. Estimated cost, $45,000. A. E. Small, Ellsworth Bldg., Archt.

Wis., Milwaukee — W. J. Raley, 711 Chestnut St., is having plans prepared for the construction of a 2 story, 30 x 150 ft. garage on chestnut St. Estimated cost, $40,000. Private plans.

Wis., Sparta—F. J. Domke plans to build a 2 story, 32 x 100 ft. garage on South Water St. Estimated cost, $50,000. Architect not selected.

Wis., Waupun — C. A. Shaler Co. has awarded the contract for the construction of a 2 story, 75 x 110 ft. vulcanizing plant. Estimated cost, $55,000.

Ont., Sarnia—The Dominion Alloy Steel Corp., Sarnia, plans to build a steel plant on St. Clair St. Estimated cost, $3,000,000. C. H. Wills, Marysville, Mich., interested. J. J. Mahon, c/o owner, Engr.

Ont., St. Thomas—The City Council is having plans prepared for the construction of a repair shop and gasoline station in connection with the new civic auto bus line. Estimated cost, $15,000. A. Miller, City Engr.

Ont., Welland—The Highway Crossings, Ltd., manufacturer of steel railway crossing signs, has purchased a 100 x 500 ft. site in Maple Leaf Park and plans to build a factory.

General Manufacturing

N. Y., Gainesville—The Gainesville Dairymen's League plans to build and equip a milk pasteurization and bottling plant. Estimated cost, between $40,000 and $50,000.

N. Y., Lackawanna (Buffalo P. O.)—W. J. Lohr, 311 Ridge Ave., plans to build a 25 ton ice plant on Lehigh Ave. Estimated cost, $62,000.

N. Y., Rochester—The Bartholomay Co., Inc., 555 St. Paul St., manufacturer of ice cream, plans to build a 4 story, 50 x 80 ft. addition to its factory. Estimated cost, $15,000.

N. Y., Rochester—A. W. Hopeman & Son, 569 Lyell Ave., plans to build a 67 x 154 ft. furniture factory on Hague St. Estimated cost, $30,000.

N. Y., Rochester—C. W. Oster, 346 East Main St., plans to build a printshop at 807 Lake Ave. Estimated cost, $8,000.

N. Y., Rochester—The Rochester Printing Co., 61 Main St., E., plans to remodel and build an addition to its plant. Estimated cost, $50,000.

N. Y., Rochester — Sampson-Wohlrab Packing Co., Buffalo Rd., plans to build a 3 story, 44 x 108 ft. refrigerator plant on Kerr St. and Field Rd. Estimated cost, $18,000.

N. C., Willets—The Natural Abrasive Mining Co. of America, Waynesville, plans to build a grinding mill, here. Estimated cost, $250,000. Address F. R. Hewitt, Waynesville, Treas.

O., Cleveland—The Euclid Ave. Lumber Co., 11715 Euclid Ave., has had plans prepared for the construction of a 1 story lumber yard, including a garage, at 11615 Mayfield Rd. Estimated cost, $40,000. Private plans.

O., Cleveland — The Penton Publishing Co., East 12th St. and Chestnut Ave., is having plans prepared for the construction of a 9 story, 135 x 135 ft. publishing plant on West 3rd St. and Lakeside Ave. Estimated cost, $500,000. R. E. Power, Treas. F. Chase, 645 North Michigan Ave., Chicago, Archt.

Pa., Bethlehem—R. K. Laros Silk Co., 9th and Linden Sts., has awarded the contract for the construction of a 3 story, 60 x 240 ft. silk factory. Estimated cost, $130,000.

Pa., McKeesport — The Peters Packing Co., Inc., has awarded the contract for altering and building an addition to its plant. Estimated cost, $100,000.

Pa., New Castle—The Wear Well Tire Co. is having plans prepared for the construction of a 1 story, 50 x 150 ft. tire factory and a 14 x 50 ft. office. Estimated cost, $50,000. Earl & Altschuler, Dean Bldg., Archts.

Pa., Phila.—The Alva Carpet & Rug Co. has awarded the contract for the construction of a 3 story, 50 x 150 ft. carpet mill on Kinsey and Hedge Aves. Estimated cost, $100,000.

Pa., Phila.—The McCallum Silk Hosiery Co., 377 Dwight St., Northampton, Mass., has awarded the contract for the construction of a 3 story, 85 x 174 ft. hosiery mill on Roosevelt Blvd. and 2nd St. here. Estimated cost, $90,000.

Pa., Phila. — Montgomery Bros., Inc., have awarded the contract for the construction of a 2 story, 27 x 70 ft. addition to packing and rubber goods factory on Penrose and Parker Sts. Estimated cost, $7,500.

Pa., Phila. — The N. E. Ice Mfg. Co., Front and Luray Sts., has awarded the contract for the construction of a 1 story, 72 x 115 ft. and 1 story, 43 x 105 ft. ice manufacturing plant on Front and Luray Sts.

Pa., Pittsburgh—The Hardie Bros., 1601 Liberty Ave., are having preliminary sketches made for a 5 story, 135 x 350 ft. candy factory on Pike and 13th Sts. Estimated cost, $150,000. J. L. Beatty, Jackson Bldg., Archt.

Pa., Shamokin—The Croninger Packing Co. plans to build a 5 story, 40 x 75 ft. packing plant. Estimated cost, $150,000. W. H. Lee, 32 South 17th St., Phila., Archt.

Pa., Watsontown—The Watsontown Sash & Door Co. plans to build a factory to replace the one destroyed by fire. Estimated cost, $150,000.

R. I., Providence—The Colwell Worsted Mills, 204 Hartford Ave., has awarded the contract for the construction of additions to its plant, including a 2 story, 55 x 200 ft. mill; a 1 story, 46 x 80 ft. dye house; 1 story, 45 x 60 ft. boiler house; 1 story, 25 x 45 ft. machine shop, and 1 story, 35 x 45 ft. shipping building. Estimated cost, $150,000.

R. I., Westerly—The Westerly Textile Co., 41 Main St., has awarded the contract for the construction of a 5 story, 32 x 50 ft. addition to its mill. Estimated cost, $50,000.

Tex., Hoskins Mound — The Freeport Sulphur Co. of Freeport, Tex., has awarded the contract for the construction of a complete sulphur mining plant here.

Va., Hopewell — The Hopewell Ice & Cold Storage Co. is having preliminary plans prepared for the construction of a 1 story, 25 x 100 ft. ice plant. Estimated cost between $40,000 and $50,000. W. C. Ellis, Mgr.

W. Va., Richwood—J. L. Horner Ice Co., Clarkesburg, plans to build a 10 ton ice plant here.

Wis., Cudahy—The Ackerman Oil Co., 221 Grand Ave., Milwaukee, has awarded the contract for the construction of a 2 story, 40 x 60 ft. warehouse and a 1 story, 12 x 20 ft. filling station, here. Estimated cost, $40,000.

Wis., Elkhorn—F. J. Schmidt plans to build a 2 story, 50 x 75 ft. ice cream factory. Estimated cost, $35,000. Architect not selected.

Wis., Madison—The Pennsylvania Oil Co., 731 East Washington St., has purchased a site on Dayton St. and plans to build a 2 story, 50 x 95 ft. oil warehouse, etc. Estimated cost, between $40,000 and $50,000. Architect not selected.

Wis., Manitowoc—A. M. Richter Sons Co., South 8th and Madison Sts., is having plans prepared for the construction of a 3 story, 70 x 82 ft. cider vinegar plant on South 9th and Grand Sts. Estimated cost, $65,000. L. I. Pentizien, Savings Bank Bldg., Archt.

Wis., Marshfield—Blum Bros. Co., 135 West 9th St., will open bids about May 1 for the construction of a 1 and 2 story, 96 x 120 ft. buttertub factory. Estimated cost, $100,000. G. A. Krasin, Marshfield, Archt.

Wis., Mayville—J. E. Hennen, Archt., 74 South Main St., Fond-du-Lac, will receive bids until April 20 for the construction of a 2 story, 50 x 90 ft. factory on Main St., for the Peerless Traveling Goods Co. Estimated cost, $50,000.

Wis., Milwaukee—The Quality Dairy Co., 2347 Hadley St., is having plans prepared for the construction of a 2 story, 46 x 80 ft. addition to its dairy on Burleigh St. Estimated cost, $20,000. H. W. Voelz, 86 Michigan St., Archt.

Wis., Oshkosh—The Mercy Hospital, 135 Hazel St., is having revised plans prepared for the construction of a 2 story, 40 x 70 ft. boiler house and laundry and a 3 story, 42 x 100 ft. convent. Estimated cost, $175,000. E. Brielmaier & Sons, 432 Bway., Milwaukee, Archts.

Wis., Park Falls—The Flambeau Paper Co. is having plans prepared for the construction of a 2 story, 75 x150 ft. wood mill. Estimated cost, $100,000. T. W. Orbison, 812 College Ave., Appelton, Archt.

Ont., Barry's Bay—Murray & Omanique plan to build a pulp grinding plant. Estimated cost, $150,000. Architect not selected.

Ont., Bridgeburg—The St. Thomas Packing Co. plans to build a cold storage packing plant in Crowland Sect. Estimated cost, $50,000. Private plans.

Ont., Ottawa—Swifts Canadian Packing Co., Ward Market, has awarded the contract for the construction of a 1 story, 50 x 100 ft. cooling plant. Estimated cost, $18,000.

Ont., Strathroy—The Butler Woolen Mills plans to rebuild plant which was partially destroyed by fire. Estimated cost, $25,000.

Ont., St. Thomas—The St. Thomas Packing Co. is having plans prepared for the construction of a cold storage plant. Estimated cost, $50,000. W. H. Moody, Mgr.

Ont., Toronto—The Lawrason Doughty Co., 42 Church St., plans to build a 2 story, 45 x 110 ft. printing plant on Hamilton St. Estimated cost, $25,000. Architect not selected.

Ont., Welland—The Universal Casket Co. plans to build a factory in Maple Leaf Park. Estimated cost, $40,000. B. A. Basque, Pres. Architect not announced.

Ont., Wiarton—The Kastner Lumber Co. plans to build saw mills to replace the ones destroyed by fire. Estimated cost $35,000.